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REPORT OF PROCEEDINGS

OF THE

Master Car-Builders' Association.

1893

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REPORT OF THE PROCEEDINGS

OF THE

TWENTY-SEVENTH ANNUAL CONVENTION

OF THE

MASTER CAR-BUILDERS' ASSOCIATION

HELD AT

LAKEWOOD, NEW YORK,

JUNE 13, 14, 15 AND 16,

1893.

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HELD AT

LAKEWOOD, NEW YORK,

JUNE 13TH, 14TH, 15TH AND 16TH, 1893.

The Convention was called to order at 9:30 A.M., on June 13, in the casino of the New Kent House, by the president, Mr. E. W. Grieves.

THE PRESIDENT: We will now proceed to open the twenty-seventh annual convention of the Master Car-Builders' Association. The Secretary will call the roll.

The Secretary called the roll. The following members were present, at this and subsequent sessions:

Adams, F. D.
Aldcorn, Thomas.
Allen, A. B.
Ames, La Mott.
Anderson, Thos.
Apps, William.
Baker, D. H.
Barber, J. C.
Barnes, D. L.
Bartlett, H.
Bean, John.
Billingham, Joseph.
Blackall, R. C.
Bossinger, H. C.
Bray, F. O.
Brazier, F. W.
Bronner, E. D.
Bryan, H. S.
Buker, Joseph.
Bush, S. P.
Bushnell, R. W.
Butler, C. J.
Carlton, E. T.
Carr, W. K.
Canda, F. E.
Chamberlain, E.
Chamberlain, J. T.
Charpiot, S. A.
Child, Alfred.
Clifford, C. J.
Coller, Charles.
Cook, J. S.
Cooke, W. I.
Cormack, William.
Cory, C. H.
Coulter, H.
Cowan, John.
Crone, S. A.
Davis, J. H.
Day, W. H.
Demarest, G. W.
Denver, James.
Divine, J. F.
Dixey, John.

Dow, G. N.
Downing, T.
Doyle, John.
Duncan, T. G.
Elliott, J. M., Jr.
Ennis, W. C.
Fildes, T.
Fletcher, J. B.
Gage, G. F.
Garland, R. T.
Garrison, P. E.
Grieves, E. W.
Gunn, Robert.
Hackett, George.
Harding, B. R.
Harris, G. H.
Harrison, W. H.
Hatswell, T. J.
Hawksworth, D.
Hayes, R. T.
Hayward, H. S.
Hennessey, J. J.
Higgins, S.
Hitt, S. B.
Hodge, John.
Hoffecker, W. L.
Holt, J. M.
Irvin, S.
Kirby, John.
Kirby, T. B.
Kittredge, A. M.
Leeds, P
Lentz, J. S.
Lewis, W. H.
Lilley, G. W.
Lindsay, T.
Lungren, W. H.
McCarty, H. C.
McCrum, J. S.
McGee, James.
McGee, F. H.
McKenna, R.
McWood, William.
Macbeth, James.
Mackenzie, John.
Maglenn, James.
Marden, J. W.
Marshall, R. E.
Martin, M. M.
Middagh, D. B.
Mileham, C. M.
Mills, Stott.
Mitchell, A. E.
Morris, W. S.
Mooney, P. T.
Packard, L.
Paxson, L. B.
Porcher, S.
Potter, G. L.
Rankin, J. H.
Rhodes, G. W.
Roberts, E. M.
Robertson, W. J.
Robson, A. C.
Sanderson, R. P. C.
Sheer, J. M.
Simons, J. E.
Sinclair, A.
Skinner, J. R.
Smith, F. B.
Smith, P.
Soule, R. H.
Stark, F. H.
Steinbrenner, A. G.
Stinard, F. A.
Sutherland, T.
Thomas, W. H.
Townsend, Joseph.
Vogt, A. S.
Voss, William.
Wade, R. D.
Waitt, A. M.
Walker, C. W.
Wallis, H.
Watts, A. H.
Webster, H. A.
Welch, B.
West, G. W.
Wilder, F. M.
Williams, C. D.
Wood, I. E.

THE PRESIDENT: The Secretary will now read the minutes of the last meeting.

MR. WAITT: As the minutes are printed, I move that the reading be dispensed with.

The motion was carried.

The President then read the following address:

GENTLEMEN OF THE CONVENTION: It is with pleasure that I greet the familiar faces of the members and friends of this Association this morning, well mindful of the honor conferred upon me by your action at our last meeting.

My training has been more in the line of car construction than in the rules of rhetoric or forensic accomplishment, and therefore I do not come before you with any glowing oratory, but shall endeavor to speak with directness and sincerity. At the same time, I beg all possible assistance on your part toward making this twenty-seventh annual convention one that shall increase the benefits already afforded to railroad companies by this Association, and add to our store of knowledge the results attained by that great teacher — Experience.

Coming from the mingled perplexities, pleasures, harassments and successes incident to railroad life, we gather here to review the work of the year, and to make plans to still further advance all interests committed to our care. We have to settle questions of great moment, involving a large amount of capital and the proper transit of almost untold wealth; but greater still, the safe conduct of precious human lives over many miles of road.

Since we last met in convention, five of our members and associates have ended their mortal existence, and gone to that bourn whence no traveler returneth. They are: Theodore Bergold, G. H. Gramling, Robert Hitchcock, D. H. Neale and John Ortton, all more or less known to many of you.

I need hardly dwell upon the progress made during the past year; with this you are all familiar; but will simply touch upon some leading points.

Inventors are more or less theorists, and we follow, to a certain extent, in the same line. The inventor with his peculiar trend of mind grasps quickly at an idea, and then attempts to fashion it into physical and practical form. In many instances while he fails to reach the end he has in view, he has taken some steps forward, leaving the way so marked that we in turn may eliminate the errors into which he has fallen, and largely conduce to the completion of the practical device that has been outlined. In the light of practice, however, the imperfections that theory does not reveal, readily become apparent; and frequently those engaged in the daily manipulation of our mechanical productions are enabled to point out that which has been the hidden source of weakness. Finally, by a combination of all these influences, and profiting by what experience has taught us, it is possible to produce that which is needful and desired.

We, as an Association, take it with no little satisfaction and without egotism when we say that the results of our labors in the past have been shown to be beneficial in a marked degree, as we look upon the equipment of the present, and we have good reason to hope that the future will bring further advancement in the same direction.

The Columbian year has been of the greatest importance to this Association, as all railroad companies have been spurred to improvement in equipment, and an increase in the safeguards connected with transportation. The subjects we handle are of such import as to have called for legislation, not only on the part of states, but on the part of the national government, notably the recent passage of what has been known as the Coupler Bill, carrying with it the application of the automatic brake, which is a measure that will have an important bearing on railroad policy during the next four or five years. It is gratifying to know, in this connection, that if legislation seemed necessary, the past work of this Association has, in a measure, been indorsed by the character of such legislation; and owing to the large number of freight cars already equipped with automatic brakes and couplers, according to the standards adopted by this Association, called forth by the demand of railroad companies for such appliances, this must necessarily have a strong influence upon, if not to act entirely in the determination of what type of brake and coupler shall finally come into general use, in compliance with the law just enacted.

It was left to the American Railway Association to fix upon a proper height of drawbars for freight cars that should become the standard of the country; 34½ inches has been chosen as the maximum height, and 31½ inches as a minimum, leaving 33 inches, the standard adopted by our Association, the average.

There has been a steady increase in the use of pressed steel in car construction, an important feature of which is the pressed steel truck, which one trunk line has adopted as its standard form of truck. Railroad companies are everywhere responding to the demand for increased strength in car construction, required by the heavy traffic of today, the fast time made, and the handling of heavier trains. With the opening up of new territory and the establishment of additional through lines, there has been a constant growth in the business of interchange, thereby enhancing the importance of the M. C.-B. Rules of Interchange for both freight and passenger cars. No doubt important recommendations will be submitted to us for consideration by the Committee on Revision of Rules. The committee appointed to investigate and report to you upon various subjects will present information of much value, and these reports should receive our serious attention, representing, as they do, much thought, and in many cases a large expenditure of labor on the part of those to whom such duties have been assigned. We should examine these questions with care and with broadness of view commensurate with the varied interests involved.

Our committee work is all important, and particular importance attaches to the work of the committee appointed last year to review the standards of the Association, and suggest any changes found necessary.

The discussions on mechanical subjects that take place at the railroad club meetings from time to time have a close connection with our work. Various questions arise during the year, and by these discussions many facts become apparent that aid in the formation of opinions as to what course would be proper. We then come before the convention better prepared for action, as our ideas have assumed definite shape in the time allowed for reflection. I am sure I voice the sentiments of all when I say we are highly gratified that such a spot has been selected for this gathering, a section of this state so renowned for its beauty. We shall doubtless carry with us bright memories of the place that shall linger in our minds when we recall the agreeable associations we here enjoy.

After spending a short period in social intercourse, looking into the faces of old friends, and hearing the experiences of those we have not met for a year, added to the inspiration received in mechanical lines, we are invigorated and are prepared to return to our labors with deeper purpose for the realization of our highest aims. Ours is a high calling; divine scripture saith, "No man liveth to himself," and whatever results attend our efforts will result in benefit to humanity. Few are living today who participated in the first convention of this Association, and yet the approved methods now in use had their beginnings in the endeavors of those who were the early promoters of Association work. With the thought in view that whatever plans we make are to be perfected by those who follow us, let us be conscientious in the performance of our duty, and devote to our work all the intelligence God hath given us.

Permit me, in closing these remarks, to wish that you may all find this occasion to be one of pleasure, and that it may result in mutual profit to us all.

THE PRESIDENT: The next order of business is the admission of new members. But if there is no objection, we will postpone that until the sixth order, and we will hear the reports of the Treasurer and Secretary at this time.

The Secretary submitted the following report:

The report of Proceedings of the Twenty-sixth Annual Convention published in October, 1892, showed a total of 305 members, divided as follows:

Active members	180
Representative members	118
Associate members	7
Total	305

Since the date of the publication of that report, fourteen railroad companies which had not, up to that time, been represented in the Association, have appointed representative members, and there have been some changes in the names of representatives from the roads formerly represented. In the same time, two representative, two active and one associate member have died, and the names of fourteen new active members have been added to the list, so that the total membership at this date is as follows:

Active members	192
Representative members	130
Associate members	6
Total	328

The number of cars represented in the Association when the twenty-sixth annual report was published, was 1,072,748. The recent returns for this year show that there are now represented in the Association, 1,123,339 cars, an increase of 50,591 cars, of which increase 22,189 cars represents the increase of cars owned by railroads formerly represented, and the balance, 28,402 cars, are owned by the new representation.

The latest returns of cars represented have been used to figure the above number of cars, but there are many cases where railroad companies have not reported any revised number of cars this year.

The cash collected by the Secretary since the date of his last report, and up to the date of closing the books for this report, June 6, 1893, is as follows:

To Dues Collected from Members	$6,049.00
“ Sale of Rules of Interchange	656.67
“ “ “ Reports of Proceedings	193.00
“ “ “ Air Brake and Signal Instructions	443.49
“ “ “ Arbitration Cases	26.93
“ “ “ Electros and Blue Prints	29.10
“ Interest on Bank Balances	25.16
Total	$7,423.35

The disbursements in the same period have been as follows:

By Printing Report of Proceedings	$1,178.80
“ “ Letter Ballots	20.25
“ “ Rules of Interchange	415.70
“ “ Air Brake and Signal Instructions	340.95
“ “ Miscellaneous	522.20
“ “ Electrotyping	177.61
“ Paid R. W. Ryan, Reporting Convention, 1892	165.12
Carried forward	$2,820.63

	Brought forward	$2,820.63
By Paid	Secretary's Salary for one year to June, 1893, including office rent and clerk	3,000.00
" "	Exchange	27.05
" "	Expenses, Preparing Room at Saratoga	11.66
" "	Expressage and Customs	6.73
" "	Stamps and Stamped Envelopes	220.91
" "	Stationery	16.40
" "	Telegrams	24.42
" "	Expenses of Members of Executive and Arbitration Committees during year	60.10
" "	Tracings and Blue Prints	48.50
" "	Balance remitted to G. W. Demarest, Treasurer	1,186.95
	Total	$7,423.35

It will be seen that the total balance has been handed to the Treasurer and that there are no funds now in the Secretary's hands.

The Association has no unpaid indebtedness, with the exception of some small accounts, for which bills have not yet been received, for printing and electrotyping a portion of the reports for the present convention.

The arrears of unpaid dues are $715. Statement showing the names of members in arrears and the amount owed to the Association by each is hereunto attached, and will be posted for inspection.

The details of dues collected from members are hereto attached. It will be observed that one payment of $5 is not credited to any member. The Secretary found after the last convention that he had $5 more than he could account for, and it is probable that some member paid this amount at the time of the last convention, which was not credited to him, and for which he failed to get a receipt.

DETAILS OF DUES COLLECTED FROM MEMBERS.

1892			
June	15	George Hackney	$15 00
"	15	J. J. Ryan	5.00
"	15	J. R. Cade	4.00
"	15	J. R. Reniff	5.00
"	15	J. S. Patterson	15.00
"	15	J. B. Michael	5.00
"	15	James Denver	5.00
"	15	Thomas Aldcorn	5.00
"	15	J. C. Barber	5.00
"	15	H. C. Bossinger	5.00
"	15	Joseph Buker	5.00
"	15	E. T. Carlton	5.00
"	15	Howard Carlton	10.00
"	15	W. K. Carr	5.00
		Carried forward	$94.00

		Brought forward	$94.00
June	15	J. J. Casey	5.00
“	15	I. W. Clark	5.00
“	15	J. S. Cook	10.00
“	15	John Cowan	5.00
“	15	A. J. Cromwell	5.00
“	15	John H. Davis	5.00
“	15	W. H. Day	5.00
“	15	J. F. Divine	5.00
“	15	J. B. Fletcher	5.00
“	15	B. R. Harding	5.00
“	15	W. H. Harrison	5.00
“	15	T. J. Hatswell	5.00
“	15	J. J. Hennessey	5.00
“	15	John Hodge	5.00
“	15	J. M. Holt	5.00
“	15	Samuel Irwin	5.00
“	15	A. M. Kittredge	5.00
“	15	L. D. Kneeland	5.00
“	15	W. H. Lewis	5.00
“	15	James Maglenn	5.00
“	15	D. B. Middagh	5.00
“	15	Thomas Millen	5.00
“	15	Stott Mills	5.00
“	15	L. Packard	10.00
“	15	G. C. Payne	5.00
“	15	Samuel Porcher	5.00
“	15	W. J. Robertson	5.00
“	15	R. P. C. Sanderson	5.00
“	15	J. R. Skinner	5.00
“	15	Peter Smith	5.00
“	15	A. G. Steinbrenner	5.00
“	15	W. A. Stone	5.00
“	15	Thomas Sutherland	5.00
“	15	W. H. Trainham	5.00
“	15	Allen Vail	5.00
“	15	William Voss	5.00
“	15	C. W. Walker	10.00
“	15	Robert Walker	5.00
“	15	David White	5.00
“	15	J. E. Wood	5.00
“	15	O. H. Reynolds	5.00
“	15	W. H. Hudson	5.00
“	15	J. C. Manly	5.00
“	15	Robert Gunn	5.00
		Carried forward	$329.00

		Brought forward	$329.00
June	15	Henry Bartlett	5.00
"	15	A. S. Vogt	5.00
"	15	F. H. Stark	5.00
"	15	C. E. Turner	5.00
"	15	W. H. McKaig	5.00
"	15	(Party unknown)	5.00
"	23	R. Hitchcock	5.00
"	23	H. A. Bowen	5.00
"	23	T. G. Duncan	5.00
July	5	George W. Lilley	5.00
"	6	C. L. Pullman	5.00
"	6	T. A. Bissell	5.00
"	6	W. H. Lewis	15.00
"	7	C. H. Dickerman	5.00
"	7	H. C. Prout	5.00
"	7	C. A. Smith	5.00
"	7	Angus Sinclair	5.00
"	7	A. R. McAlpine	5.00
"	7	Job H. Jackson	5.00
"	7	T. C. Salveter	5.00
"	7	J. P. Levan	5.00
"	7	K. W. Blackwell	5.00
"	7	J. Taylor Gause	5.00
"	9	J. H. Raymond	5.00
"	9	C. H. Howard	5.00
"	9	W. J. Wilcox	5.00
"	9	James Cullen	20.00
"	9	D. H. Neale	5.00
"	12	H. C. McCarty	5.00
"	12	C. H. Zehnder	5.00
"	12	Robert Miller	5.00
"	13	George F. Gage	10.00
"	13	James Macbeth	5.00
"	13	P. E. Garrison	5.00
"	14	F. D. Adams	40.00
"	15	W. S. Morris	30.00
"	15	George N. Dow	5.00
"	15	Isaac N. Keith	5.00
"	15	G. W. Demarest	5.00
"	15	D. L. Barnes	5.00
"	15	N. W. Sample	40.00
"	15	Pulaski Leeds	95.00
"	15	E. Geffcken	10.00
"	15	T. B. Kirby	5.00
		Carried forward	$769.00

		Brought forward	$769.00
July	16	Thomas Downing	5.00
"	18	Peter H. Peck	10.00
"	19	M. M. Martin	70.00
"	19	Richard English	15.00
"	19	L. H. Turner	30.00
"	20	H. S. Huidekoper	5.00
"	20	G. W. Rhodes	5.00
"	20	F. D. Casanave	180.00
"	20	G. W. Rhodes	5.00
"	20	A. Rowland	5.00
"	20	J. Richardson	5.00
"	21	W. D. Minton	5.00
"	21	Jacob Johann	5.00
"	22	C. J. Butler	20.00
"	22	H. L. Preston	50.00
"	23	G. E. Van Brunt	10.00
"	23	L. B. Paxson	170.00
"	23	Robert McKenna	155.00
"	23	E. E. Carver	15.00
"	25	William Buchanan	270.00
"	25	S. A. Crone	5.00
"	25	J. S. McCrum	50.00
"	25	W. P. Siddons	15.00
"	26	James McGee	20.00
"	26	D. Hawksworth	45.00
"	26	J. L. Greatsinger	10.00
"	26	George Gibbs	5.00
"	26	W. G. Brimson	15.00
"	30	Charles Coller	30.00
"	30	R. M. Golbraith	25.00
"	30	G. W. Rhodes	5.00
"	30	J. H. McConnell	135.00
"	30	J. W. Marden	35.00
"	30	M. N. Forney	5.00
"	30	Thomas Tyrrell	5.00
"	30	Ned Irish	5.00
"	30	G. W. Rhodes	5.00
"	30	William Forsyth	115.00
"	30	J. T. Chamberlain	50.00
Aug.	1	G. W. West	25.00
"	1	E. Burton	10.00
"	1	R. A. Emerson	5.00
"	1	W. L. Hoffecker	125.00
"	1	C. A. Thompson	5.00
		Carried forward	$2,554.00

		Brought forward	$2,554.00
Aug.	2	L. H. Miller	5.00
"	3	J. N. Barr	140.00
"	8	H. T. Bruck	5.00
"	8	F. Johnson	5.00
"	8	G. W. Miller	5.00
"	8	John Kirby	100.00
"	8	Charles Graham	5.00
"	8	R. C. Blackall	90.00
"	8	R. G. Chase	5.00
"	8	J. B. Glover, Jr	10.00
"	11	J. J. Tomlinson	5.00
"	15	W. T. Smith	10.00
"	15	William McWood	5.00
"	15	Herbert Wallis	115.00
"	15	F. J. Hecker	5.00
"	15	J. M. Sheer	20.00
"	15	J. C. Barber	100.00
"	15	William Cormack	35.00
"	15	John S. Lentz	205.00
"	15	J. R. Groves	30.00
"	15	J. H. Rankin	5.00
"	15	R. W. Bushnell	30.00
"	15	William Garstang	65.00
"	15	Theo. Bergold	5.00
"	18	Joseph Taylor	5.00
"	18	James Meehan	60.00
"	18	J. M. Wallis	390.00
"	18	H. Coulter	5.00
"	18	R. E. Marshall	5.00
"	18	W. H. Lungren	5.00
"	18	M. Donaldson	15.00
"	18	Robert Quayle	30.00
"	18	Joseph Townsend	40.00
"	19	E. D. Bronner	70.00
"	22	William Apps	85.00
"	22	Henry Schlacks	5.00
"	25	Caspar Wicke	5.00
"	25	J. O. Pattee	45.00
"	25	La Mott Ames	15.00
"	25	S. J. Pratt	5.00
"	25	John Player	140.00
Sept.	5	A. Dolbeer	35.00
"	5	John Mackenzie	40.00
"	5	A. W. Gibbs	35.00
		Carried forward	$4,594.00

		Brought forward	$4,594.00
Sept.	5	W. C. Ennis	15.00
"	5	Henry Ryder	10.00
"	5	C. H. Kenison	20.00
"	5	Allen Vail	40.00
"	5	J. J. Conolly	20.00
"	5	E. P. Lord	100.00
"	5	F. O. Bray	10.00
"	5	A. B. Allen	5.00
"	8	A. M. Waitt	5 00
"	15	T. A. Fraser	5.00
"	16	H. Boutet	5.00
"	16	George Rommel	5 00
"	16	W. H. Miller	50.00
"	19	J. W. Baker	5.00
"	22	R. H. Wilbur	5.00
"	22	W. A. Ryan	5.00
"	23	C. W. Davenport	5.00
"	23	E. T. Silvius	5.00
"	24	E. B. Wall	65.00
Oct.	5	William Rutherford	5.00
"	7	W. H. Thomas	55.00
"	14	G. F. Wilson	85.00
"	15	J. G. Butterfield	5.00
"	15	R. D. Wade	50.00
"	25	J. J. Sullivan	5.00
"	25	L. J. Cox	5.00
"	28	A. E. Mitchell	225.00
"	29	James McGregor	5.00
"	29	E. A. Williams	25.00
Nov.	1	W. J. Robertson	35.00
"	5	H. Roberts	25.00
"	7	J. E. Doran	5.00
"	7	W. Augustus	5.00
"	15	J. J. Casey	15.00
"	15	E. M. Humestone	25.00
"	22	T. A. Summerskill	5.00
Dec.	6	R. H. Soule	75 00
"	6	C. H. Cory	45.00
"	29	Thomas Anderson	30.00
1893			
Jan.	5	M. T. Carson	20.00
"	5	Clem Hackney	5.00
"	13	J. E. Simons	5.00
"	24	George Hackett	5.00
		Carried forward	$5,739.00

		Brought forward	$5,739.00
Jan.	25	Charles Blackwell	5.00
Feb.	14	J. B. Morgan	35.00
Mar.	10	E. W. Grieves	145.00
May	5	R. T. Hayes	5.00
"	8	J. N. Mileham	5.00
June	5	Benjamin Welch	85.00
"	5	H. J. Small	5.00
"	5	J. J. Ryan	5.00
"	5	J. R. Cade	5.00
"	5	J. Coghlan	10.00
"	5	E. C. Spalding	5.00
			$6,049.00

On motion the report was accepted.

The Treasurer submitted the following report :

TREASURER'S REPORT.

To the President and Members of the Master Car-Builders' Association :

Amount on hand June 13, 1892	$4,184.07
Received interest on same to May 19, 1893	81.94
Received June 12, 1893, of J. W. Cloud, Secretary	1,186.95
Total on hand June 13, 1893	$5,452.96

G. W. DEMAREST,
Treasurer.

On motion the report was accepted.

THE PRESIDENT : The next order of business is the assessment and announcement of annual dues. I have to say in this connection that the Executive Committee at its session held yesterday recommended that the annual dues be made the same as last year, namely, $5 per vote.

MR. WAITT : I move that their recommendation be adopted.

The motion was carried.

THE PRESIDENT : The admission of new members is next in order and that will include the payment of dues.

MR. CLOUD : I want to say that I hope that everybody who pays his dues now will see that I make a check mark opposite his name, or put down the amount that he pays. I thought last year that I had every name, but as I stated in my report I had $5 more than I had checked off. If each one will see that he is credited with the amount paid he will get the receipt later.

A recess of five minutes was then taken.

THE PRESIDENT: The next business is the appointment of nominating and other committees. I appoint for the nominating committee, W. H. Day, chairman; Samuel Irvin, L. Packard, W. H. Harrison and W. L. Hoffecker.

Committee on subjects to report at the last session of this convention: A. W. Waitt, R. E. Marshall, S. A. Crone.

Committee on Correspondence and Resolutions: William McWood and E. M. Roberts.

Members will recall that five of our members died during the year. It becomes the duty of the president to appoint a Committee on Obituaries to report to the Secretary within sixty days. I will appoint the following committees:

On Theodore Bergold: Samuel Irvin, James McGee.

On John Ortton: Charles H. Cory, M. M. Martin.

On G. H. Gramling: E. M. Roberts, W. H. Day.

On Robert Hitchcock: F. D. Adams, J. T. Chamberlain.

On D. H. Neale: H. C. Prout, A. E. Mitchell.

It has been announced since we came into the convention that W. B. McPhail died on May 5. I will appoint a committee to prepare the obituary later.

MR. MITCHELL: Did not Mr. John Black of the C. H. & D. die within the last year?

MR. MACKENZIE: Mr. Black is dead, but he is not a member of this Association, I believe.

MR. CLOUD: He is not a member.

THE PRESIDENT: The next is the election of an auditing committee. This committee must be composed of members not officers of the Association, and to be nominated by anyone not holding office in the Association. We are ready now for nominations for an auditing committee.

MR. PACKARD: I nominate Mr. McWood.

MR. WAITT: I nominate Mr. A. E. Mitchell.

MR. BLACKALL: I nominate Mr. Packard.

MR. CHAMBERLAIN: To save time I move that the Secretary cast the ballot of the Association for the three members of the auditing committee.

The motion was carried.

MR. CLOUD: I would say to the chairman of the committee that the vouchers and all the accounts of the Secretary are at the disposal of the committee whenever it needs them. It is unnecessary to say that the ballot is cast and the committee elected.

MR. CLOUD: Under the head of unfinished business I would say that the report of the committee of last year on the standards of the Association was made the first order of business for this year by motion. But inasmuch as Mr. Soule, who is chairman of the committee, is not present and will not be here until this session of the convention is adjourned, it may be that you would prefer to put off the consideration of that report and the four sub-reports under it, which are the first four on the programme, until a later day. I understand that Mr. Soule will arrive here this afternoon.

MR. MARSHALL: I move that it be deferred, as Mr. Cloud suggests, until Mr. Soule arrives.

MR. MACKENZIE: Why not make it the first order of business Thursday morning?

MR. MARSHALL: I accept that.

THE PRESIDENT: Then we will change it to make it the first order of business Thursday morning.

The motion was carried.

MR. DAY: Before entering into the regular order of business, I have a motion that I would like to make with a view of facilitating business, and that is that we limit debate to five minutes, and no member to talk more than twice on the same subject.

THE PRESIDENT: That no one member shall speak more than twice is a part of the By-Laws.

MR. DAY: It is not generally adhered to.

THE PRESIDENT: It is not often adhered to unless there is a real necessity for it. The last article in the By-Laws reads that no member shall speak more than twice in the discussion of any question until all the other members who want to speak and have not been heard have spoken.

MR. ADAMS: I second Mr. Day's motion. While it is in the By-Laws it never has been the practice.

MR. DAY: It is a very important motion, Mr. Chairman, and I would like to see it carried on that account. You know a man will get up and have his say, and will sit down and very soon he will rise again and address the convention, and that sort of thing keeps the convention from carrying on its business as it should be carried on.

If it is necessary that one shall speak more than twice, let it be by consent of this convention. I am satisfied that if it is a question that is of importance the convention will give its consent.

MR. MARSHALL: Is that moved as an amendment to the By-Laws, or is it only to hold for this convention?

MR. DAY: Only for this convention. As an amendment to the By-Laws I understand it would not be in order.

MR. BLACKALL: As Mr. Adams has seconded the resolution, I would support it. (Laughter.)

MR. ADAMS: Probably Mr. Blackall thinks I am going to do a good deal of talking, but I have made up my mind that I will not.

THE PRESIDENT: The motion is that addresses shall be limited to five minutes, and no member shall speak more than twice upon the same subject excepting by unanimous consent of the convention.

MR. MACKENZIE: I think that motion is altogether uncalled for. It places the chairman of the convention in a very arduous position, it seems to me. He has simply got to watch everybody and rap speakers down when they go beyond the limit. I know that there are men in this convention who cannot express their sentiments in five minutes, or ten minutes. Mr. Day is one of them; I am another. We come here to give voice to our opinions, and we want time to it. If it takes ten minutes or fifteen minutes, all right.

MR. ADAMS: We never had a convention when we got our business all completed.

The motion was put and lost.

THE PRESIDENT: That motion was a little out of order, although we entertained it. It properly belonged under the head of new business. Is there any further unfinished business?

MR. CLOUD: I know of no further unfinished business to come before this convention.

MR. CLOUD: Under the head of new business, the following has been handed to the desk:

To the President and Members of the Master Car-Builders' Association:

It is proposed to move at the next meeting of the Association that the fourth clause of Article IX of the Constitution be amended to read:

"Such ballot to be filled up, signed and remailed to the Secretary, who shall count all the ballots received at the expiration of thirty days from the date that they were sent to members and he shall then announce the vote in such manner as the Executive Committee may prescribe."

This will properly come up for action one year hence. Its purpose is to reduce the time required to be allowed to elapse from sixty days down to thirty days so that the report of proceedings can be published at an earlier date thereafter. It is only required to give this notice at this time for action next year.

The President: The Secretary has some new business to present.

Mr. Cloud: Certain matters considered by the Executive Committee yesterday were ordered to be laid before the convention, and I think they will come in properly at this time. We have invitations from railroad companies extending courtesies which I will read together, so that you may have them both before you for consideration. The first is as follows:

New York, May 10, 1893.

The N. Y. L. E. & W. R'y Co. hereby tender to the M. C.-B. and M. M. Associations an excursion from Lakewood to Oil City, Pa., on Saturday, June 17. The train will leave Lakewood on a schedule which will be announced at the convention and will make a short stop at Meadville, Oil City, and a lengthy stop at Franklin, to enable the visitors to see the oil country.

(Signed) A. E. Mitchell,
Supt. Motive Power.

The other invitation is as follows:

Buffalo, N. Y., May 26, 1893.

Through the kind coöperation of the Chautauqua Steamboat Company and the N. Y. C. & H. R. R. R. Co., our general superintendent, Mr. R. Bell, has volunteered an excursion to the members of the American Railway M. M. Association and the M. C.-B. Association from Lakewood, N. Y., to Niagara Falls during the time of the convention at Lakewood, in June next.

I have been directed to present the invitation to the Secretaries of the respective Associations, and they to confer with one another, and if the invitation can be accepted, name a date that would be agreeable to both Associations.

We hope this invitation, which we most cordially extend, will be accepted.

(Signed) A. Vail,
Gen. M. M.

I simply acknowledged these communications with thanks on behalf of the Association, and they are now before you for action.

Mr. Mackenzie: I move that they be received, Mr. Chairman.

The motion was carried.

The President: Now what action do you desire to take on the invitations.

Mr. Blackall: The invitation, I notice, is to the Master Mechanics as well as to the Master Car-Builders. I do not see how this convention can act for both.

Mr. Cloud: It seems to me, gentlemen, if you take these up separately now, you could, if you saw fit, accept the invitation from the N. Y. L. E. & W., because the date is fixed, and if the Master Mechanics can, they will accept it. It does not require any action on our part in connection with them, whereas the other requires a date to be fixed and would necessitate some consultation with the Master Mechanics' Association before accepting the Western New York & Pennsylvania's invitation.

Mr. Demarest: I move that the invitation of the New York, Lake Erie & Western Railroad Company be accepted by this Association.

The motion was carried.

Mr. Mitchell: I wish to announce that the train will leave about 7:30 central time, which is about 8:30 time of the hotel.

Mr. Mackenzie: I move that the invitation of the Western New York & Pennsylvania be referred to the Executive Committee for action.

The President: After consulting with the Master Mechanics?

Mr. Mackenzie: I do not see how you are going to consult with the Master Mechanics, because your convention will adjourn before theirs meets.

The President: The request made in the communication is that the Secretary of this Association shall consult with the Secretary of the Master Mechanics' Association and make the arrangements accordingly.

Mr. Cloud: I will say that I immediately wrote to Mr. Sinclair upon receipt of this invitation and he said he would try and be able to answer on behalf of the Master Mechanics' Association early in this convention, and I received a message from him yesterday which is not intelligible, because it has been bulled by the operator, apparently. But it indicates to me that he expects to know what he can say when he gets here, which I understand is likely to be today. So if you should leave this in the hands of the Executive Committee to act for the Association after they can consult with Mr. Sinclair, it might settle it.

The President: The motion has been made and seconded that the invitation of the Western New York & Pennsylvania be left in the hands of the Executive Committee to consult with the Secretary of the Master Mechanics' Association on his arrival here.

The motion was carried.

Mr. Cloud: I have still another communication which the Executive Committee has referred to the convention for consideration. The communication is from Mr. A. M. Waitt, of the Lake Shore & Michigan Southern Railway Company, addressed to the Secretary, under date of June 7. It is as follows:

> Dear Sir,—At the request of President Grieves, of the Master Car-Builder's Association, and also on my own behalf, I send you herewith a blue print showing a new arrangement for the location of the dummy coupling hook for freight cars equipped with air brakes, which I would request be submitted to the Executive Committee for their consideration, to go before the Association as a modification of the present standard location and arrangement for dummy coupling hooks. As is well known, it is practically impossible, with the present arrangement, to hang up the hose in such a way that it will not kink and after awhile crack or break through the rubber where the kink occurs. Furthermore it is known that with the present location, where it is hung up, the hose makes a convenient step which is used by people in passing from one side of the train to the other. On gondola cars it frequently happens that large lumps of coal or ore will drop over the end of the car and fall in a loop made by the hose, thereby tearing it.
>
> The device shown in the print obviates all of these difficulties and enables the hose to be hung in a natural easy curve, making it very rare to find a hose so hung with a kink in it. This device has been used on the P. & L. E. and Lake Shore roads for nearly a year, and gives excellent satisfaction, and we have adopted it for general use. The prints have been submitted to a number of other roads, all of whom have approved of it. It also has been submitted by Mr. Grieves to the Westinghouse Company, who are favorable to it. The matter of hanging is, if anything, less expensive than with the present mode.

The Executive Committee refers this to the convention for action. But it recommends that a committee be appointed on this subject, either now to report at a later session of this convention or to report next year, as you may think best. The blue print referred to is here on the table. I might say, in short, that the hose hangs across the center line of the car under the car coupling.

Mr. Waitt: I would say for the information of the members that they will find a cut of this device in a copy of the *Railroad Car Journal* placed on some of the seats.

Mr. Marshall: I move that this be referred to a committee to report to the session on Thursday.

The motion was seconded.

Mr. Mackenzie: Is this in the line of standards of the Association?

The President: Yes, sir.

Mr. Mackenzie: It seems to me there is no necessity for a motion to carry that.

The President: It is only to report on the matter to the next session, so that we can send it out to letter ballot. Otherwise it will take us two years to change the standard.

The motion was carried.

The President: I appoint on that committee Mr. R. E. Marshall, Mr. A. M. Waitt and Mr. Samuel Higgins. Has any member any further new business to offer? The Secretary suggests that we had better decide what time we are running on. We seem to be so located that it is pretty hard to decide at just what time we should open and close the sessions. There was some misunderstanding about the opening of the meeting. The hotel clock seems to be eastern time. It has been suggested that we run the convention on central time.

Mr. Cloud: I would like to call the attention of the members to the fact that at the convention last year the hours of session were altered so that they should be from 9 o'clock A.M. to 1:30 P.M. Now, shall it be 9 o'clock by eastern time or central time?

Mr. Marshall: I move to make it central time.

Mr. Adams: I second the motion.

Mr. Waitt: It seems to me that it would be a little unfortunate if we passed that resolution. At 1:30 central time it would be 2:30 eastern time. The ladies would be kept from their dinner if they waited for the gentlemen attending the convention; and further, it would make it quite a late hour for us. It seems to us if we are in Rome we should do as the Romans do. As we are under the reign of eastern time, we should go by eastern time. The hotel clocks are that way, the boats run that way and the mails are that way. We get up that way and we go to bed that way.

Mr. Mitchell: I believe there is only nineteen or twenty minutes difference in sun time between Lakewood and New York, so it looks to me it would be better to run it by eastern time.

Mr. Mackenzie: There is more difference than that between

Chicago and Lakewood. I think it would be better to run it the other way.

The President: The principal point is that the time is an hour earlier than we have been accustomed to meet. To get here at nine o'clock we have got to get around pretty early in the morning. It takes about an hour for breakfast.

Mr. Marden: Do I understand that the hotel people are running their hotel on eastern time?

The President: Yes, sir.

Mr. Marden: Then their meals would be served on eastern time.

The President: Yes, sir.

Mr. Marden: Now, if we run on central time and commence our meetings at nine o'clock on central time that would mean ten o'clock on eastern time, and then we would adjourn at 2:30 on eastern time. How would that be for our dinner hour?

Mr. Adams: I withdraw my seconding of that motion.

Mr. Mackenzie: I second the motion, Mr. Chairman.

The President: The second cannot be withdrawn except by consent of the mover.

Mr. Marden: It seems to me that we should regulate our hours so that we can come somewhere near to the dinner hour of the hotel.

Mr. Waitt: I move as an amendment to the motion that is made, that the motion be changed—that we go by the time that is standard at Lakewood.

Mr. Mackenzie: I would amend that motion, with the consent of the Chair — that we open on eastern time and close on central time.

The President: The amendment has been made to the motion that we open and close the convention by hotel time.

Mr. Marshall: I will accept that.

The President: The amendment has been accepted, so we will put the amendment.

The amendment was carried.

Mr. Higgins: The New York, Lake Erie & Western is very anxious that suitable accommodation should be provided for the members and their friends when they leave here over our line, whether east or west bound, and we would like some notice, before the convention adjourns, of what accommodation would be required. I would like to have the members on or before tomorrow evening leave communications at the hotel office addressed to me stating about what time they expect to leave here on our road and what accommodations will be required, and I will endeavor to make the best arrangements possible for their comfort.

THE PRESIDENT: I hope the members will notify Mr. Higgins at the hotel just when they are ready to leave.

MR. HIGGINS: I might add that as this is not a terminal we have no Pullman cars convenient and we will have to bring them from Jersey City, Buffalo or perhaps Chicago, as Pullman cars are in great demand at the present time, but we will do the best we can for you if we have proper notice.

THE PRESIDENT: Any further new business? If not, we will take up the reports of the committees. Inasmuch as the report of the committee of last year on standards has been deferred, we shall also be forced to defer the first four reports which relate to Mr. Soule's report of last year. We will not call No. 5 yet, as there is still some work to be done on that report. We will take up No. 6, "Attachments of M. C.-B. Couplers to Cars." Mr. Bronner is chairman of that committee. Mr. Bronner will you please read your report?

Mr. Bronner read the following report:

REPORT OF COMMITTEE ON ATTACHMENTS OF M. C.-B. COUPLERS TO CARS.

To the President and Members of the Master Car-Builders' Association:

Your committee was commissioned "To recommend a form in detail, of M. C.-B. Coupler at rear, so as to take yoke, tail bolt and continuous drawbar attachments; also, to consider and report upon the best form of draft attachment to cars. To confer with 'Committee on Tests of M. C.-B. Couplers.'"

Circulars of inquiry were sent to all members of the Association, to the manufacturers of M. C.-B. couplers and to manufacturers of special draft devices. Replies were received from forty-five members, representing about 620,000 cars, and also from about all of the coupler and draft device manufacturers.

The first portion of the work of your committee was to design for recommendation, a standard tail end for the M. C.-B. coupler. From the information received from members of the Association, it would appear that a solid end is preferred by a large majority. For the reason also that a single piece is usually preferable in mechanics to two or three pieces, we would recommend for adoption, the form, of the dimensions shown in Figs. A and B. These dimensions appear to be in general use where the solid end is used, as shown by the drawings furnished your committee by the railroad companies and by the coupler manufacturers. Nearly all of the users of the yoke attachment are employing rivets from 1 to 1⅛ inches in diameter for securing the yoke to the coupler, and as the representatives of the largest number of cars are using rivets 1⅛ inches in diameter, your committee has recommended the rivet holes to be 1 3/16 inches in diameter, and the rivets to be 1⅛ inches in diameter.

Practically all of the users of modern continuous draft rigging are using an equalizer 1 by 5 inches through the shank of the bar. Your committee has, therefore, recommended an opening, or slot, in the shank of the coupler to accommodate this size of equalizer, as shown (1⅛ by 5⅛ inches).

In regard to the portion of the design referring to the tail bolt, your committee finds that the representatives of 343,196 cars have answered that the yoke attachment is their standard. Representatives of 197,201 cars have said that the tail bolt is their standard. Representatives of 72,224 cars have adopted the continuous as their standard attachment. Among the representatives of the 197,201 cars having the tail bolt as their standard, members representing 172,153 cars have signified to your committee that they consider the tail bolt the weak point of their draft rigging, and that they intend to adopt the yoke, or are aiming to devise a draft rigging which will enable them to use the yoke, or tail strap attachment for the coupler. The adherents, therefore, of the tail bolt, would appear to be in a hopeless minority. This being the case, the application of M. C.-B. couplers with the tail bolt attachment must soon cease.

Your committee has, therefore, not thought it advisable to recommend any change in that portion of the design, even though it is convinced that the 2-inch diameter tail bolt which it will now take, and which is the size it finds almost universally used with the M. C.-B. coupler, is weak and inefficient.

In Figs. A and B we show two drawings (see end of report), one for use with yoke, or tail bolt, and one including slot in shank for continuous draft rigging. On account of the *comparatively* small number of roads using the latter device, your committee has not thought it advisable to recommend for adoption a design adapted for all three devices. It would, therefore, recommend that both designs go before the Association, with a view of adopting both designs as standard, or the one including slot, or opening, for continuous draft rigging.

In regard to that portion of the instructions in which the committee is requested "to consider and report upon the best form of draft attachment to cars," it will first show the recommendations formerly made by the Association, and the standards already adopted bearing upon the subject.

First.—Standard height of drawbars, top of rail to center of drawbar, 33 inches. (Page 275, Proceedings for 1892); (Richmond, 1872, resolution); (Old Point Comfort, 1890, letter ballot.)

Second.—Showing recommendations made by the Association in regard to the "attachment of the drawbars at their rear end." (Pages 275, 276, 277, Proceedings for 1892); (New York, 1876, resolution); (Chicago, 1879, resolution), as follows:

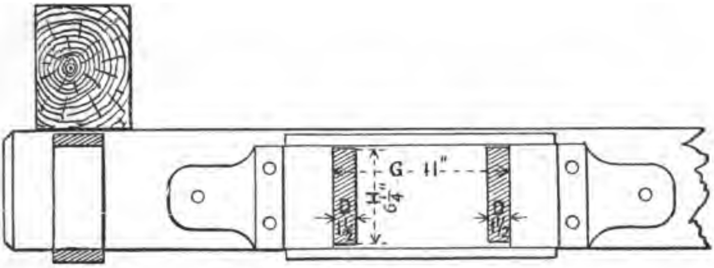


FIG. 19.

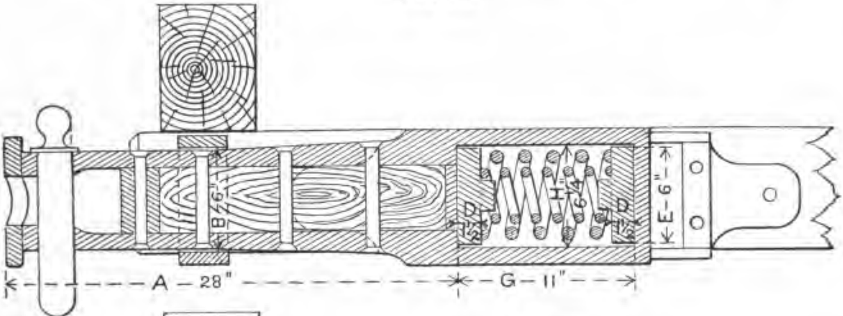
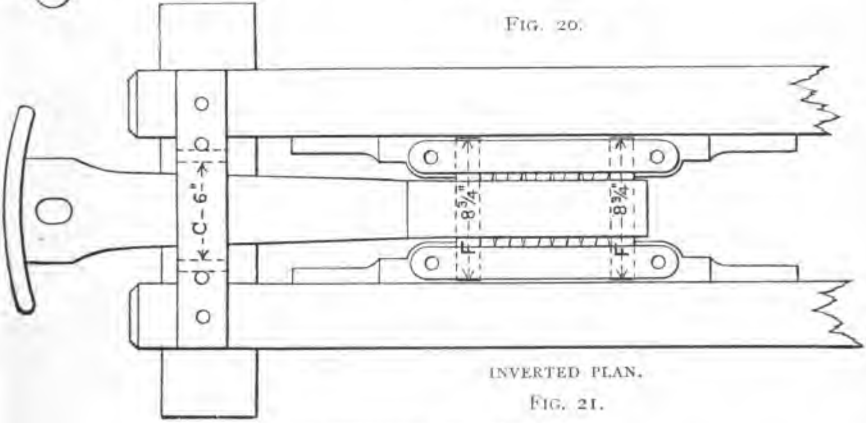


FIG. 20.



INVERTED PLAN.

FIG. 21.

"DIMENSIONS OF DRAWBARS.

"The following were recommended as standard dimensions for drawbars at the Thirteenth Annual Convention, held in Chicago in 1879.

"The length *A* (*see Fig. 20*), from the end of head to the first follower plate, to be 28 inches.

"The depth (*B*) at outer yoke in carrying plate to be 6 inches.

"The width (*C*) of opening for drawbar, in the carrying plate or yoke, to be 6 inches.

"The follower plates to be made of wrought iron, and rectangular in form, the thickness (*D*) to be 1½ inches; width (*E*) 6 inches; and the length (*F*) 8¾ inches.

"The length (*G*) of the house of the drawbar to be 11 inches, and the width (*H*) 6¼ inches.

"The pin hole in drawbar to be made so as to take pin 2 by 1½ inches and to be 4 inches from face of drawbar.

"When a strap is used in back end of drawbar, it shall have a clear space of 11 inches long and 6¼ inches wide. When a spindle is used it shall be 2 inches diameter, 17 inches long from under side of head to outer edge of key; the key to be 2½ inches wide and ½ inch thick.

"The drawbars to be so placed in the cars as to locate the coupling pins not less than five inches from the center to the face of the dead woods."

Third.—Showing standard dead-blocks and location of same. (Pages 280, 281, 282, Proceedings for 1892); (Philadelphia, 1882, resolution); (Saratoga, 1884, letter ballot); (Niagara Falls, 1886, letter ballot), as follows:

FIG. 22.

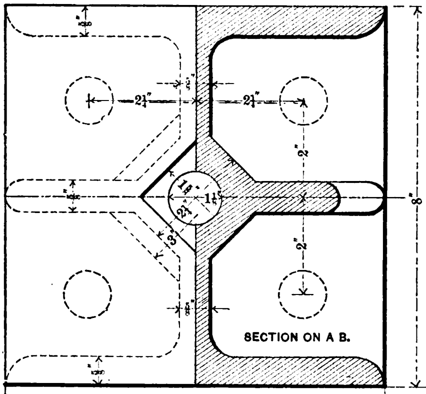
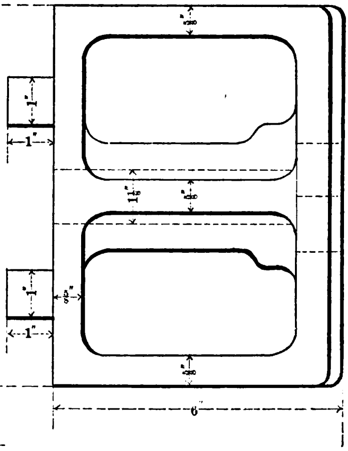


FIG. 23.



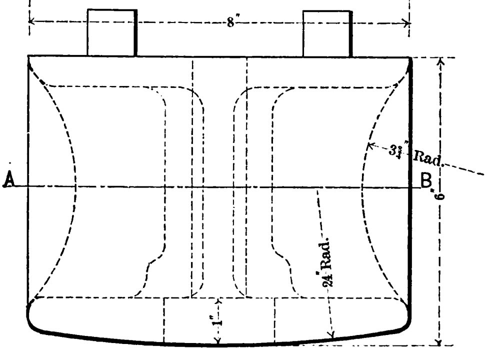


FIG. 24.

Standard Casting for Double Dead-blocks.

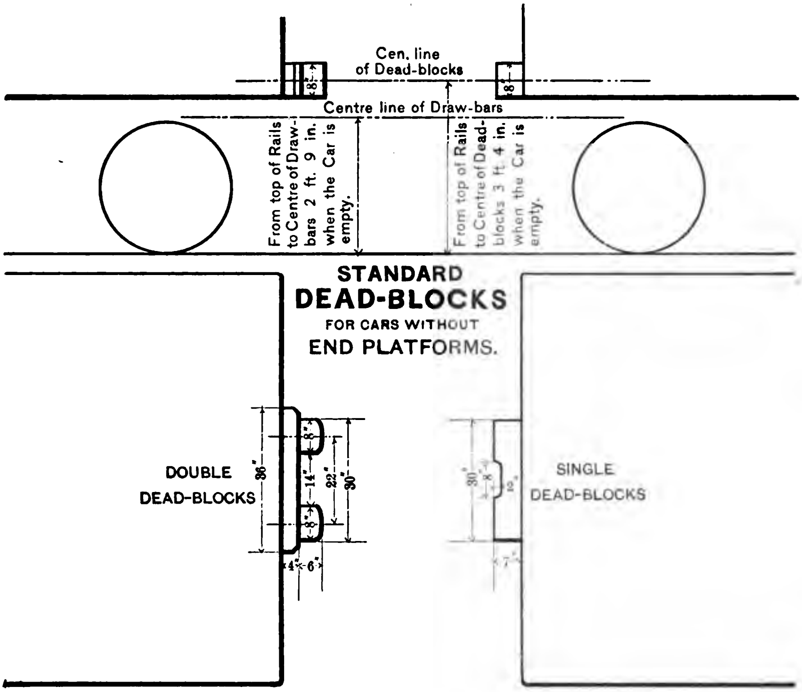

Cen. line
of Dead-blocks
8"
8"
Centre line of Draw-bars
From top of Rails to Centre of Draw-bars 2 ft. 9 in. when the Car is empty.
From top of Rails to Centre of Dead-blocks 3 ft. 4 in. when the Car is empty.
STANDARD
DEAD-BLOCKS
FOR CARS WITHOUT
END PLATFORMS.
DOUBLE
DEAD-BLOCKS
36"
8"
14"
8"
22"
30"
4"
6"
SINGLE
DEAD-BLOCKS
30"
8"
10"
7"

Fig. 25.

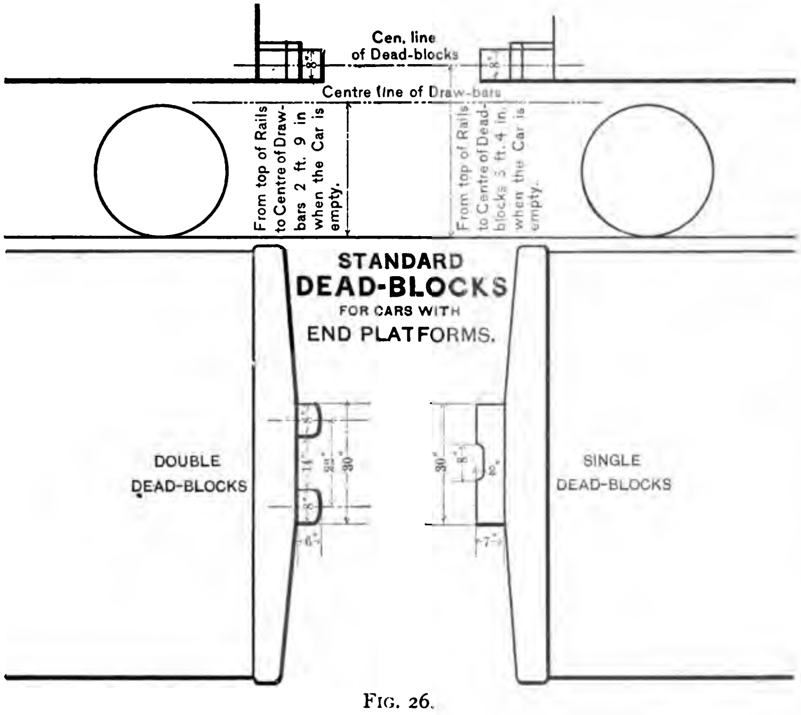

Cen. line
of Dead-blocks
8"
8"
Centre line of Draw-bars
From top of Rails to Centre of Draw-bars 2 ft. 9 in. when the Car is empty.
From top of Rails to Centre of Dead-blocks 3 ft. 4 in. when the Car is empty.
STANDARD
DEAD-BLOCKS
FOR CARS WITH
END PLATFORMS.
DOUBLE
DEAD-BLOCKS
8"
14"
8"
22"
30"
6"
SINGLE
DEAD-BLOCKS
30"
8"
10"
7"

Fig. 26.

"DEAD-BLOCKS.

"Standard dimensions of dead-blocks were recommended at the Sixteenth Annual Convention, held in Philadelphia, in 1882. (*See pages 45 and 47 of report of that meeting.*) These dimensions were amended at the Eighteenth Annual Meeting, held in Saratoga, as follows:

"Double dead-blocks are to be made 8 inches square on face and 6 inches thick, and are to be placed 22 inches apart from center to center and to have 14 inches space between them.

"Single dead-blocks are to be not less than 30 inches long, 7 inches thick and 8 inches deep, measured vertically.

"By order of the Executive Committee the amendments were submitted for the approval of the members by letter ballot (*see pages 156-162 of the Eighteenth Annual Report*), and as more than two-thirds of the votes cast were in favor of the amendments they were adopted.

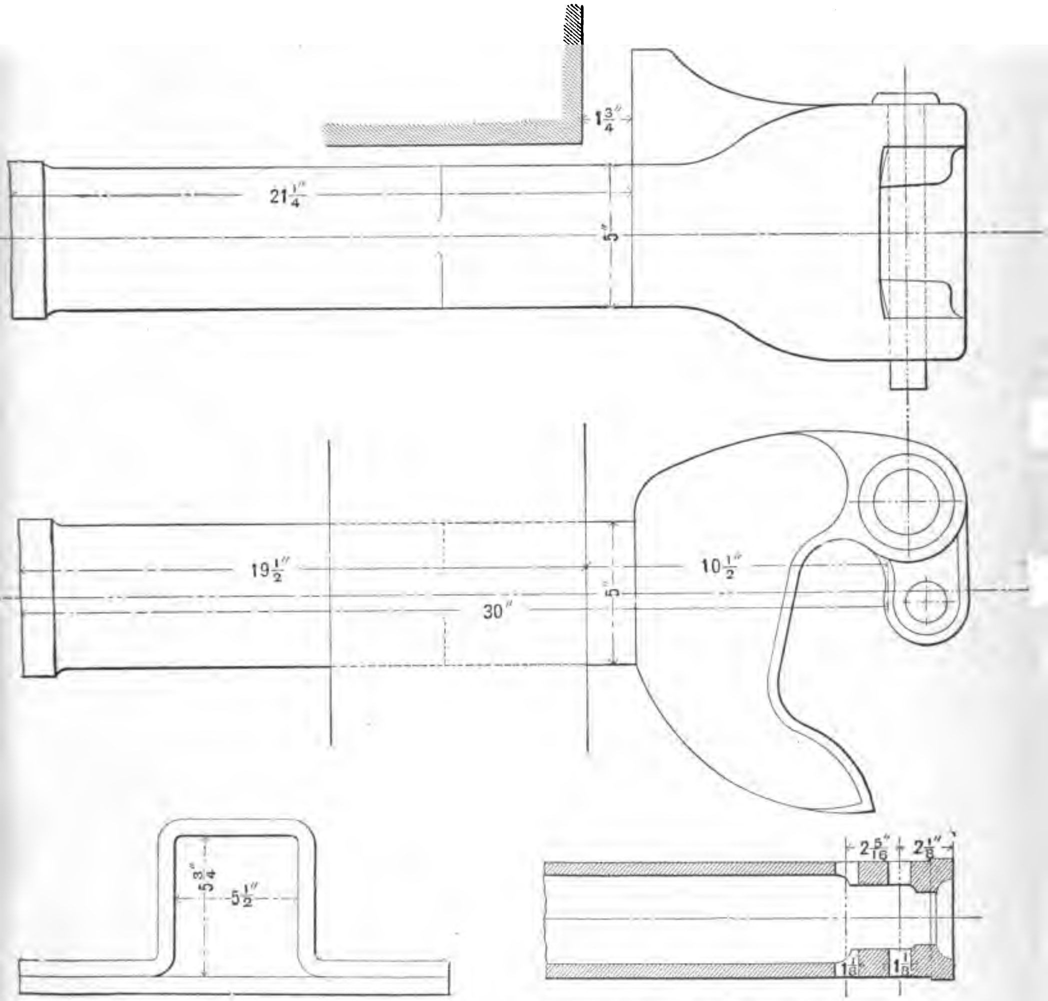
"At the Twentieth Annual Convention, held at Niagara Falls in 1886, it was agreed (*see page 48 of report of that year*) to submit the following recommendations for decision by letter ballot: 'That when double dead-blocks are used, their vertical height, and their width measured crosswise to the track, be each 8 inches, and their thickness, measured lengthwise to the track, be 6 inches; that they each consist of a casting as represented by Figs. 22-24.'

"'That when a beam, attached to the end sill, is used for carrying the dead-blocks, it be made 36 inches long, not less than 4 inches thick and 8 inches vertical depth.'

"These recommendations were submitted to letter ballot and were adopted. (*See pages 183 and 184.*) Figs. 25 and 26 represent the present standards for double and single dead-blocks."

Fourth.—Recommended capacity of draw springs and buffer springs, not less than 18,000 pounds. (Page 280, Proceedings for 1891); (Minneapolis, 1887, resolution.)

Fifth.—Plate IV, showing Standard M. C.-B. coupler. Length 30 inches, length 28 inches, for repairs; size at neck 5 by 5 inches; tail end; standard carrying iron 5½ by 5¾ inches. (Pages 277, 280, Proceedings for 1892); (Minneapolis, 1887, letter ballot); (Saratoga, 1889, letter ballot), as follows:



MASTER CAR-BUILDERS' STANDARD AUTOMATIC COUPLER AND CARRIER IRON.

As adopted by Letter Ballot, September, 1889.

" AUTOMATIC COUPLERS.

" At the Twenty-first Annual Convention, held in Minneapolis, in 1887, it was agreed to submit to letter ballot the question whether ' the Janney type of coupler shall be recommended as a standard form of coupling.' (*See pages 199 and 208 of Twenty-first Annual Report.*)

" The recommendation was submitted to letter ballot and was adopted. (*See pages 208, 243 and 253.*)

" At the same meeting the Executive Committee was instructed to prepare a drawing of contour lines for the Master Car-Builders' standard automatic coupler. Such a drawing was prepared—of which Plate VI is a copy—and engravings of it were issued to members of the Association with a circular dated April 8, 1888.

" At the Twenty-sixth Annual Convention, held at Saratoga, N. Y., drawings of two gauges for preserving the contour lines and thickness of knuckle of Master Car-Builders' couplers, the same as were announced by the Executive Committee in its circular of September, 1891, were presented, and motion prevailed to submit to letter-ballot vote. This question was therefore submitted to letter-ballot vote, and the gauges, as shown in Figs. A and B herewith, were adopted as standard gauges of the Association.

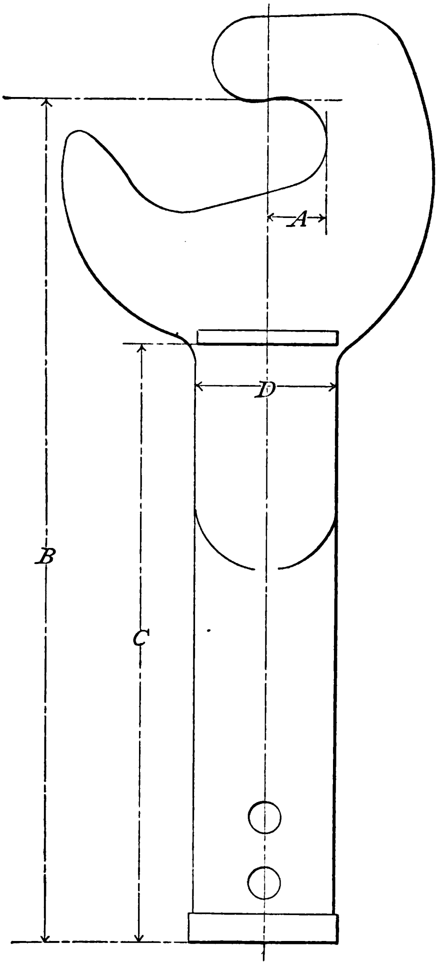
" *These gauges, properly proven by master gauges, may be procured from the Pratt & Whitney Company, of Hartford, Conn.*

" At the Twenty-third Annual Convention, held at Saratoga in 1889, certain recommendations were made in regard to dimensions of Master Car-Builders' type of coupler and of open space in carrier irons for same, as well as form of coupler at tail end. These recommendations were submitted to letter-ballot vote, as ordered by the convention, and each recommendation had more than two-thirds of the votes cast in its favor, and was, therefore, adopted as a standard of the Association.

" This action fixed 30 inches as the standard length of the Master Car-Builders' type of drawbar, when measured as indicated by 30 inches on Plate VII; it also fixed the standard size of neck of this drawbar back of the head at 5 by 5 inches; and it fixed the open space in carrier iron for same drawbar at 5½ inches horizontally and 5¾ inches vertically, all of which are shown on same plate.

" In addition to this standard length for Master Car-Builders' type of drawbar, another drawbar of same form and dimensions, except that the length is 28 inches, by making the barrel 2 inches shorter, was adopted for use only on cars already in service when desired."

Sixth.— Plate V, showing maximum and minimum limits for dimensions of Standard M. C.-B. coupler (Saratoga, 1892, letter ballot) as follows :



	Std.	*Max.*	*Min.*
A	2 in.	$2\frac{1}{16}$ in.	$1\frac{15}{16}$ in.
B	30 "	$30\frac{3}{8}$ "	$29\frac{15}{16}$ "
C	$21\frac{1}{4}$ "	$21\frac{3}{8}$ "	$21\frac{3}{16}$ "
D	5 in. sq.	$5\frac{1}{16}$ "	$4\frac{15}{16}$ "

We will now take up the various standards and recommendations referred to above by numbers, first to sixth, inclusive.

First.— This standard is now being investigated by another committee.

Second.— The committee finds that the recommendations herein set forth are practically a dead letter, excepting possibly the diameter of the tail bolt and the thickness of the followers. We find, however, that the designs furnished your committee by the greater number of members, representing the greater number of cars, are evolutions or improvements of this type of draft rigging. Almost all the designs differing radically from the general type are patented devices, and could not, therefore, be recommended as substitutes for it. Your instructions do not cover the recommendation of a standard attachment, but in view of the universal disregard of the present recommendations, we conclude to advise their abandonment and the substitution of a plan of the same general type but of more modern design. (See Fig. C, at end of report.)

Third.— The committee finds the same state of affairs in reference to this standard as shown in the foregoing one. Only one representative has stated that he was using the M. C.-B. standard buffer blocks with the M. C.-B. coupler. Therefore, if a standard drawing is to be shown, it should be more in accord with what is being used with the M. C.-B. coupler.

The principal reasons, we infer, leading the users of buffer blocks to disregard the standard are that it is too short (measured in a line parallel with the rail) to be effective with the M. C.-B. coupler, and if located according to the standard, the corners would come in contact with the M. C.-B. coupler. Your committee, in its circular of inquiry, asked for information and opinion as to the use of buffer blocks, considering this in the line of their duty on account of the relation buffer blocks bear to attachments proper. The information received has developed a curious state of affairs. The representatives of but 98,707 cars say they are using buffer blocks with M. C.-B. couplers, while representatives of 489,009 cars say they are not. Yet, out of the latter number the representatives of 132,917 cars say that, in their opinion, the buffer blocks are of advantage and should be used. Therefore, the representatives of 356,089 cars have expressed an opinion against buffer blocks, and of 231,624 cars for them.

Among opinions presented by members, as to value of buffer blocks with M. C.-B. couplers, the following are examples:

(*a*) "With M. C.-B. couplers, if they (dead-blocks) are made so as to come together before draft spring is exhausted, it will interfere with coupling. If not so located, they are of no use."

(*b*) "We think if iron dead-blocks were of advantage with old link and pin coupler, as almost universally used in the East, there can be no question of their being of much greater advantage to the M. C.-B. coupler. An automatic coupler does not make as good a buffer as a non-automatic, and requires something to protect it. The horn, or bracket, which has heretofore been depended upon, does not meet the case. It is simply a make-shift used by western roads because they could not withstand the popular cry against the 'man-killer.' Now, however, that automatic couplers are being introduced, doing away with the necessity of trainmen going between the cars, there can be no objection to the iron dead-blocks. They should by all means be applied. They will save the chucking back and forth of the draft rigging, which brings such severe strains on the attachments as to finally cause them to rupture and allow them, either through the blow, or excessive lost motion, to break, or else to pull out and drop on the track."

(*c*) "Dead-blocks, if efficient, would prevent coupling on curves."

(*d*) "If made long enough to suit two cars, both equipped with M. C.-B. couplers, they cannot be brought into play when one car so equipped is coupled to another car with the ordinary type of drawhead, and with dead-blocks suitable to that drawhead. If, on the other hand, the cars equipped with M. C.-B. couplers are also equipped with dead-blocks have sufficient projection to come into play when such a car is coupled to a car equipped with the ordinary drawhead and dead-blocks to suit this drawhead, the dead-blocks on the car equipped with M. C -B. coupler will be too long to permit the coupling of two cars with M. C.-B. couplers."

(*e*) "On account of the strain being practically removed from the draft rigging when cars are subjected to heavy buffing, and being distributed through the different members of the floor framing, our rigging and the dead-blocks are so designed that the dead-blocks of two cars coupled together will strike before the draft springs become solid, thereby reducing to a minimum the liability of breaking the draft spring; when coupling to a car equipped with a link and pin, it is a safeguard for a man making the coupling."

Some members have expressed the opinion that they were dangerous to life and limb, and others, that they saved life and limb.

In view of the recent Act of Congress, compelling railroad companies engaged in interstate commerce to equip their cars with automatic couplers, it appears to your committee that the question of danger in the use of the double buffer blocks will soon be eliminated from the problem.

The question, as it remains, will then be this:

1. Can the buffer blocks be applied with automatic couplers, so as to relieve the draft gear from the severe buffing strains and carry the shock to the line of greatest resistance without interfering with the practical operation of the coupler under ordinary conditions?

2. If it wholly, or partially, accomplishes this purpose, will the saving effected be sufficient to balance the increased cost?

In regard to the first proposition, we find that the testimony of those using the double buffer blocks is to the effect that they can be so designed as to relieve the draft rigging from the severe shocks of coupling and running up of slack in trains, and still not interfere with coupling operations on curves. Your committee has also made some experiments and finds no difficulty in making couplings under any circumstances in connection with curves as sharp as thirty-eight degrees, even when gears are old and couplers have been driven back so that the inner face of knuckle projects but little over one inch from face of buffer blocks.

In discussing the second proposition, it is obvious that a buffer block cannot be designed to meet all the conditions at the present stage of the M. C.-B. coupler. The committee will therefore confine itself to the value of buffer blocks in connection with M. C.-B. couplers meeting M. C.-B. couplers only. In view of the recent enactments of Congress and the various State Legislatures, and the fact that the M. C.-B. type is the standard of this Association, this will eventually be the only condition they will be obliged to meet.

Let us look at the action of M. C.-B. couplers without double buffer blocks: When they come together with the knuckles closed, the points of the knuckles take the shock. When they come together with one, or both knuckles open for coupling, the knuckles again take the shock on their points. See Figs. D and E.

Practically all the users of M. C.-B. couplers use the buffing horn, or stop, on the back of it. This is, of course, an attempt to have the heavier buffing blows received and absorbed directly on the frame of the car, through the horn, just before the spring is exhausted. The result of our observations on this point is that, as a general rule, the wooden buffer block is not sufficiently protected and sometimes not at all. Light iron plates and light bolts are used, and as a result, the plate is bent or broken, and the wood is abraded by the pounding of the horn, until finally the entire buffing blow is received by the draft gear.

We also find bad design in some of the drawings submitted to us. There is considerable variation in the distance from the horn to the dead-wood, and in some cases the compression designed for the draft spring is less than this distance. In these cases all buffing must be taken by the gear. In spite of the evident desire to have the horn, or buffer stop, take the heavy blows, the constant increase in the buffing resistance of draft gear indicates a distrust of the device. However, if the design can be improved, and we are successful in receiving heavy buffing blows on the end sill, or dead-wood, through the horn, we cannot avoid the damage to knuckles and couplers due to their use in coupling and switching in yards and the running up of slack in trains.

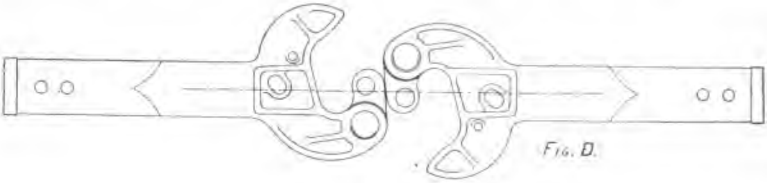


FIG. D.

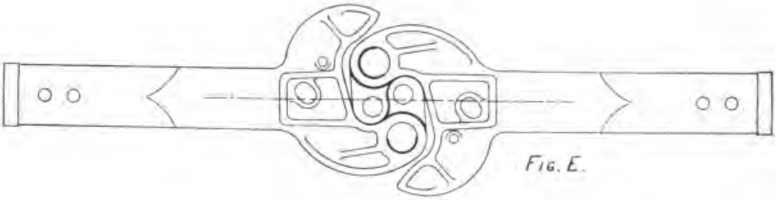


FIG. E.

There is another item which must also be considered in connection with dependence upon the buffer stop to save the gear. We find that about thirteen per cent of all coupler bodies broken are broken through the neck. This must be attributed in great measure to the wedging action caused by use of the buffer stop. These are the conditions the coupler will be submitted to without the double buffer blocks.

The increase of automatic couplers and the consequent absence of switchmen between cars, whose presence has hitherto tended to moderate the blows, will induce less caution and greater force in bringing cars together.

Some of the members have serious doubts as to the possibility of relieving the attachments by means of the buffer stop. If they are correct, the coupler and attachments, without double buffer blocks, have to do all the work and sustain the consequent damage.

Your committee has prepared statistics, taken from the records of one of the lines represented on the committee, showing the number of cars repaired for one month, and classified the nature of the repairs. The repairs due to drawbars and draft gear present a total of 37½ per cent of all cars repaired :

DEFECTS.	NO. OF CARS REPAIRED.
Cast-iron buffer blocks	11
Dead-woods	95
Dead-wood bolts	75
Drawbar stop castings	205
Drawbar stop casting bolts	436
Drawbar stop casting straps	129
Drawbar stop casting strap bolts	221
Drawbar followers	476
Drawbar springs	472
Drawbar pockets (yokes)	51
Drawbar pocket (yoke) bolts	107
Drawbar rests (carrying irons)	51
Drawbar tail bolts	217
Drawbar continuous rods	25
Drawbar tail bolt keys	25
Draft timbers	249
Draft timber bolts	1,008
Drawbars (common)	1,026
Drawbars (M. C.-B.)	114
Drawbar knuckles (M. C.-B.)	179
Drawbar knuckle pins, etc. (M. C.-B.)	39
Total draft gear defects	5,211
All other causes	8,654
Total number of cars repaired during month	13,865

These figures show to what extent expenditures and delays are due to defective draft gear. There is certainly some cause here for *serious consideration* as to the value of double buffer blocks.

We believe that the use of double buffer blocks does not interfere with the practical operation of the M. C.-B. coupler. We believe that it would protect the couplers, knuckles and draft gear to a great extent by receiving the heavy buffing blows in the line of greatest resistance and absorbing their force in the framework of the car, which must eventually receive them under all conditions through the inadequacy of a spring to absorb them. The additional cost of double buffer blocks cannot be above $5 per car over the single dead-wood. We are inclined to think that this would be much more than counterbalanced by the saving in repairs, switching and delay to freight.

As double buffer blocks are now being used to considerable extent with the M. C.-B. coupler, and as there is a further feeling evinced by certain companies to use them; and as your committee finds the standard now in force of no value since the adoption of the M. C.-B. coupler, they would recommend the adoption of the design shown in Fig. G as the standard for use with the M. C.-B. coupler.

Fourth.—This recommendation appears to be very elastic, as is befitting a spring, and the members have so construed it. A majority of members (representing a majority of the Association) replying to our question as to the desirability of increasing the capacity of the draft springs, have answered in the affirmative, and we find that out of the replies, members representing but 130,019 cars are using springs of 18,000 pounds capacity, while members representing 394,362 cars are using draft springs from 19,000 pounds to 25,000 pounds capacity.

A majority of the members favor an increase in the capacity of the single draft spring, and for this reason and the mechanical reason that where the same end can be attained by the use of one part it is preferable to the use of two, your committee would recommend an increase in the capacity of the single spring, which plan would also seem to better meet the requirements of the prevailing draft rigging.

To illustrate and compare the blow-absorbing capacity of the ordinary 18,000-pound draft spring with the full amount of the blow, we will quote from a report read before the New York Railroad Club, May 19, 1891, by Mr. D. L. Barnes:

"Those who favor high capacity draft springs and appliances for absorbing blows other than that provided for by the buffer stop, will be interested in noting what it is possible to accomplish in this direction. For this reason a diagram has been prepared, which shows the capacity of one or two draft springs to absorb the blow delivered by a loaded 60,000-pound freight car moving at about four miles per hour. The area of each of the two small triangles at the bottom of the diagram represents the capacity of one draft spring of ordinary dimensions to resist a blow before it is closed up. The large rectangle shows on the same scale the amount of the blow which can be delivered by a 60,000-pound freight car moving at about four miles per hour. This is a speed at which couplings are frequently made, and at such speed no real damage is generally done either to the car or to the draft gear. A comparison of the area of the large rectangle with the area of the two small triangles shows how much greater is the blow than the capacity of the draft spring on the two colliding cars to absorb it. This relates to the ordinary gear with one spring. The capacity of gears with two springs would be represented by twice the combined area of the two triangles. With two springs per gear, there would still remain a large percentage of the comparatively light blows at four miles per hour to be absorbed wholly by the draft timbers, the sills, the buffer stop or the dead-blocks, according to which of these is interposed to take it."

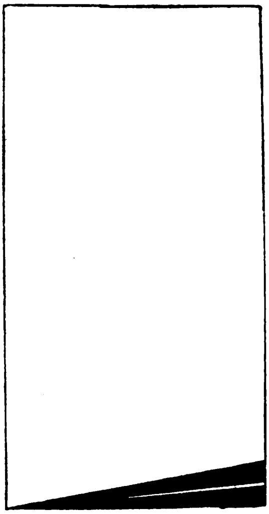
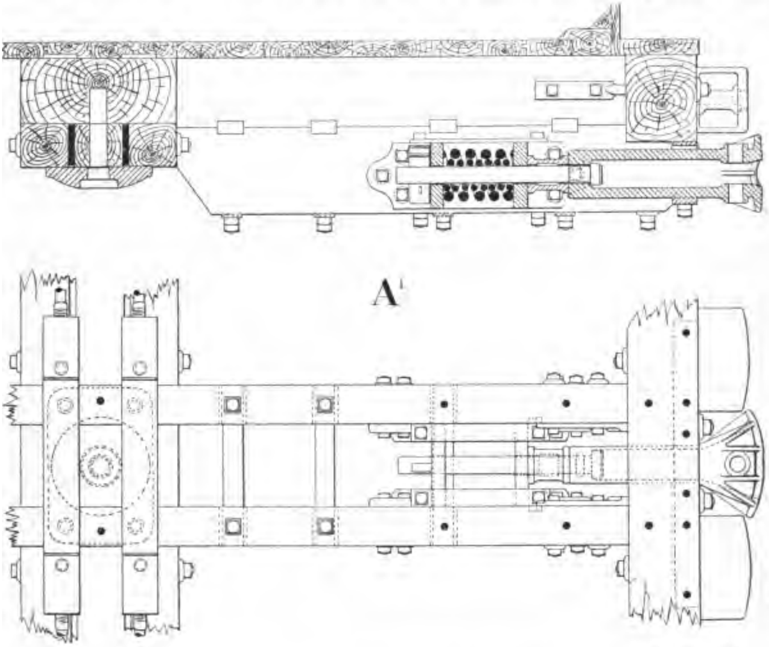


Fig. F.

The diagram, Fig. F, is evidently made on the assumption that the car which is hit is immovably fixed to the rail, which is never the case in actual practice, as the car can be slid if the brakes are on, or rolled if they are not on, and so absorb much of the shock, either by the car itself or together with other cars which may be in the rear of it, by the compression of their draft springs, or by moving them also.

The foregoing shows very clearly that it is practically impossible to absorb the ordinary buffing blows by means of the draft spring, and that the greater portion must be absorbed by the framework of the car itself. An appreciation of the comparatively light capacity of the 18,000-pound draft spring, viewed in the above light, is probably what has induced so large a proportion of the members to increase the capacity of their draft spring. In view of this tendency, and also not losing sight of the fact that the draft spring cannot absorb it all, and, on account of the tremendous recoil attendant upon a very great increase in the capacity of the draft spring, we would recommend the substitution of a capacity of 22,000 pounds in place of the old recommended practice of "not less than 18,000 pounds."

Fifth.—In relation to the fifth standard referred to, your committee has recommended a standard tail-end. It finds the use of the standard carrying iron shown, confined to five or six lines, and that it is used not as a carrying iron, but above and at the sides of the neck of the coupler, as a spacing or chafing iron.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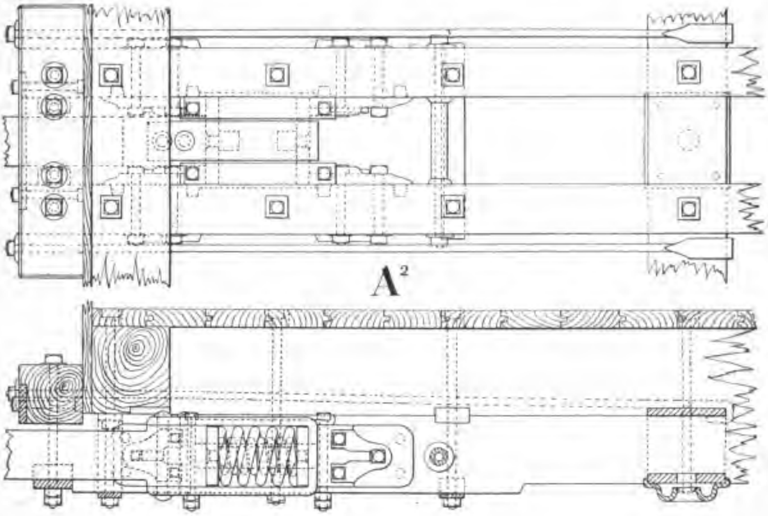
Sixth.—On account of the importance of the standard distance, 21¼ inches from the horn to the end of the coupler in carrying out designs for receiving buffing blows, either on the horn, or on double buffer blocks, your committee would urge on the members the necessity of the use of this gauge.

As a matter of information connected with its report, your committee illustrates below the evolution of the more modern types of draw gear. The illustrations are all taken from drawings of standard draft gear, sent us in compliance with request in our circulars of inquiry.

Figs. A^1 A^2 A^3 show the simplest improvements. They consist of an attempt



A^2

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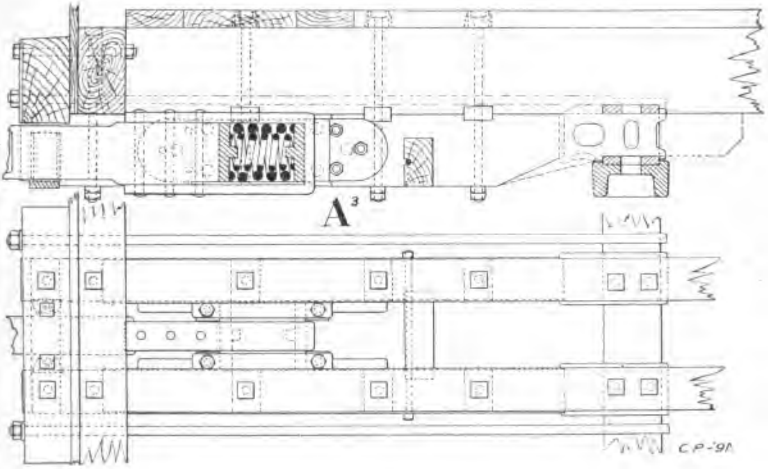
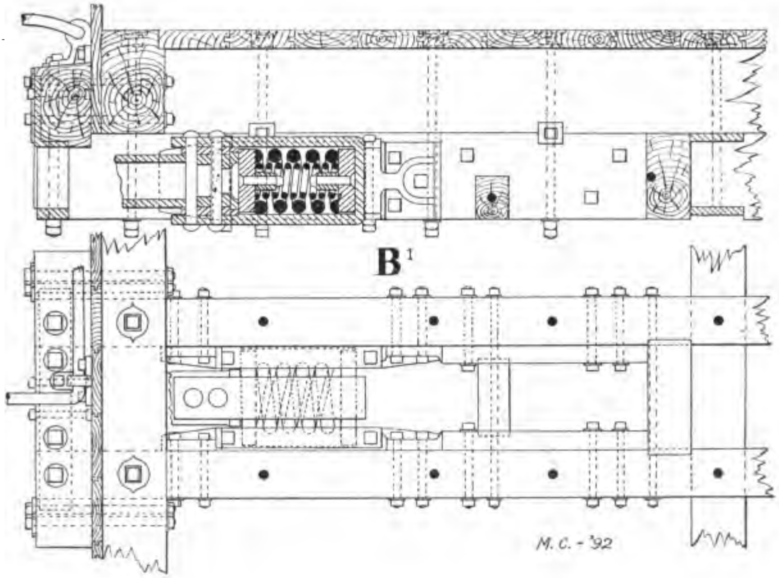
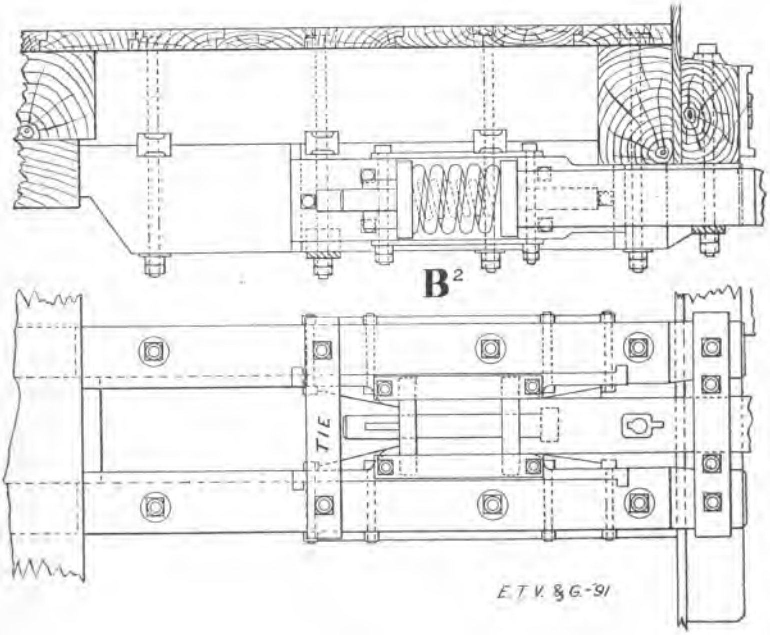


A^3

C P '91



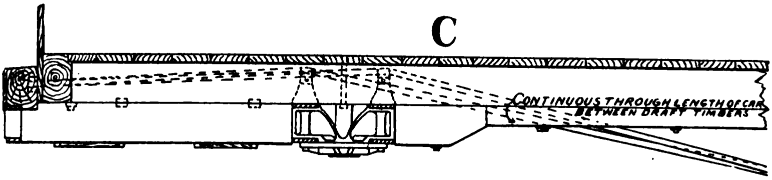
B^{1}

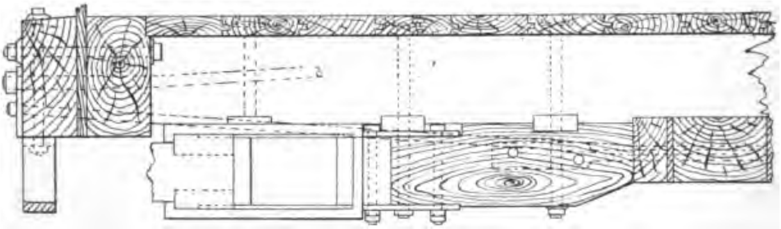


B^{2}

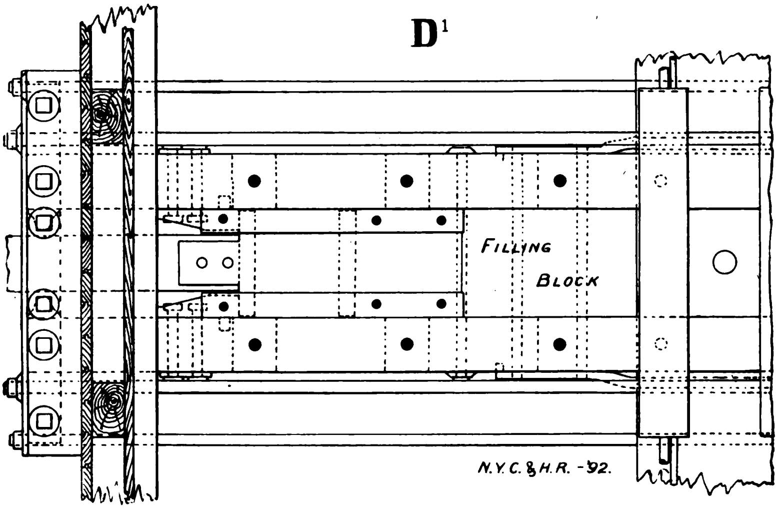
to overcome the spreading tendency of the draft timbers, caused by the buckling of the back follower. The designers have endeavored to accomplish this by means of straps tying the opposite draft bolts together at the bottom, or cross bolts between the two draft timbers with blocks or thimbles to stiffen them. Next in order are those designs, as shown in Figs. B^1 B^2, in which the ends of the straps or lugs have been squared up, and solid timber or filling pieces carried from their back ends to the body bolsters. This is an attempt to take the shearing strains from the stop block or stop bolts, and thereby increase the resistance of the attachments to buffing blows. *C* illustrates how this resistance is still further increased by the use of filling blocks bolted to the under side of the center sills and filling in solid between the ends of the draft timbers, thereby forming a continuous buffing timber and relieving the strains

C

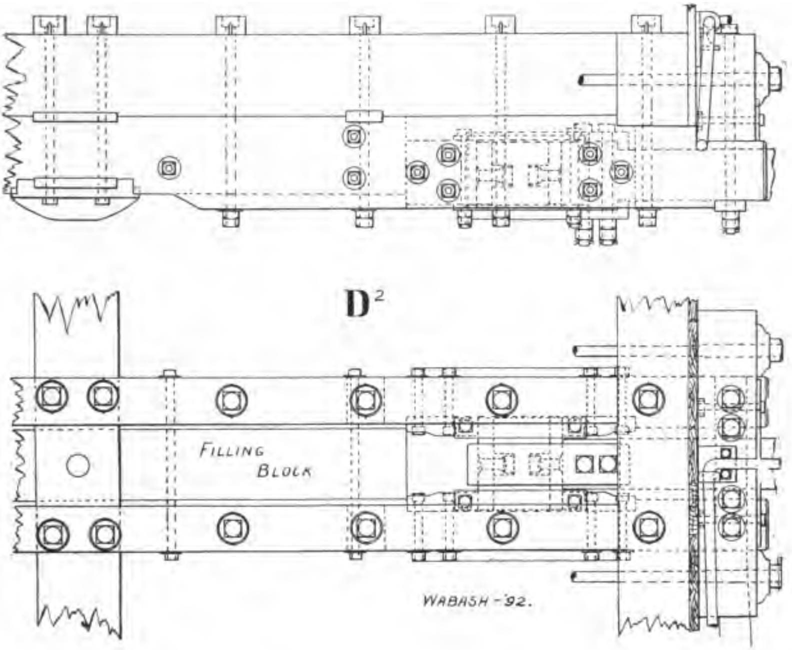




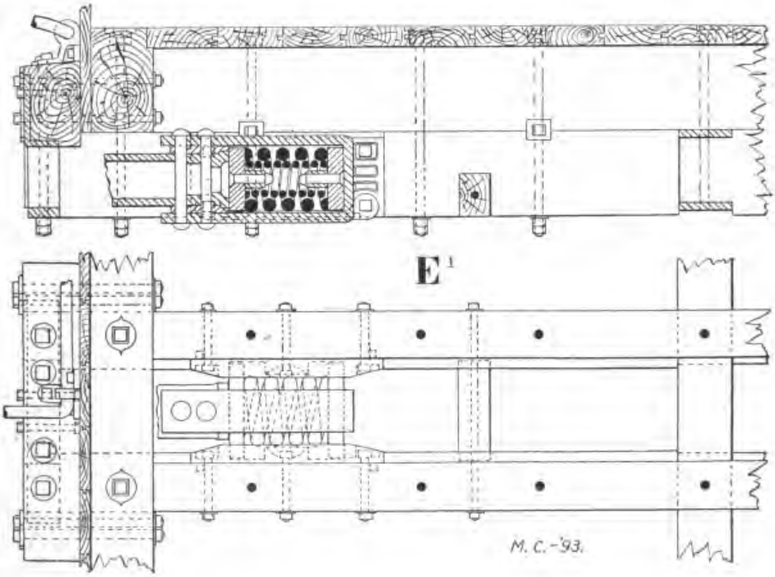
D^1

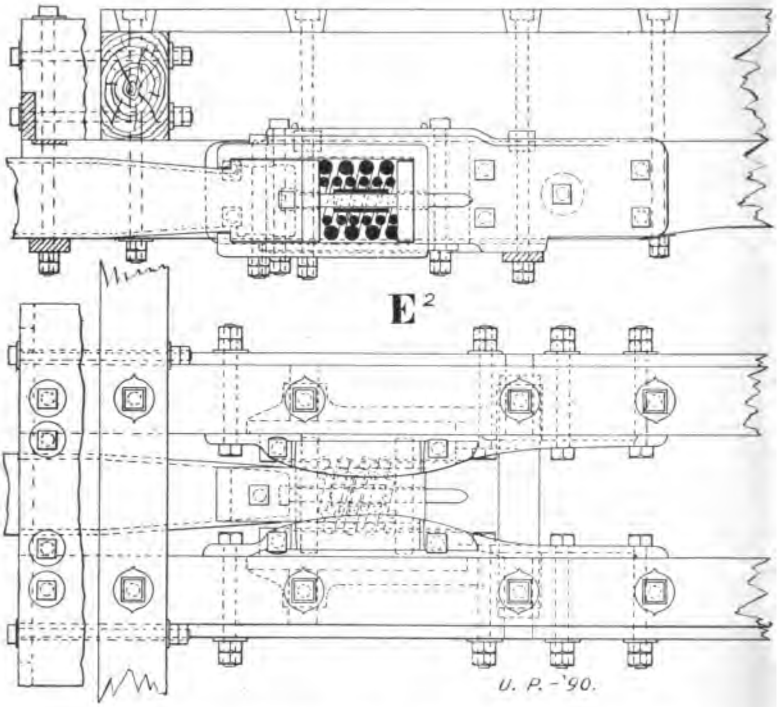


D²



E¹





E^2

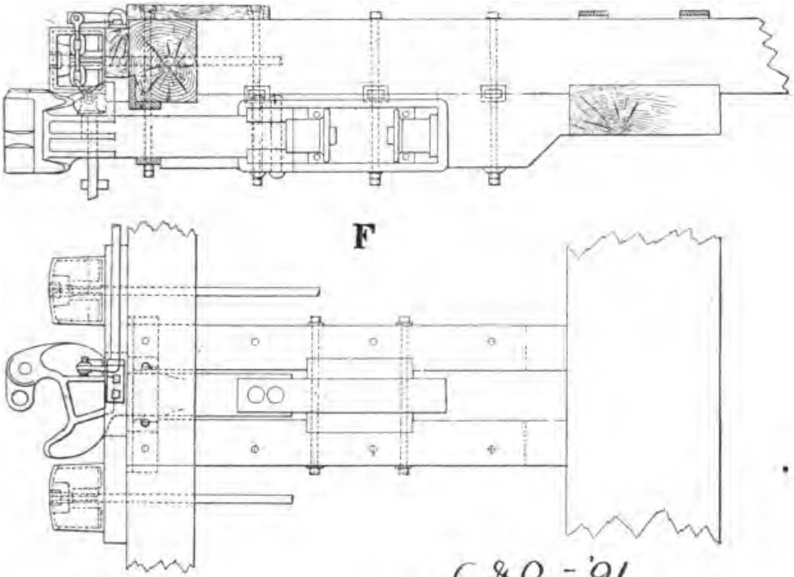
in the draft timbers and draft timber bolts. D^1 D^2 show another method of increasing resistance to buffing strains. In these designs a solid block is bolted between the draft timbers running from the ends of the stops to or through the body bolsters.

A further departure from the M. C.-B. recommendation is shown in illustration E^1 E^2, in which the front and back drawbar stops are made in one piece, whereby strains are equally distributed through both.

Illustration *F* shows a design in which it is attempted by inclosing the spring in a case and bolting the two halves of the case securely between the draft timbers by bolts running through all to accomplish what they do in A^1 A^2 A^3 by binders, in B^1 B^2 by increasing buffing resistance, and in E^1 E^2 by uniting the front and back drawbar stops.

G illustrates a design in which it is intended to take a portion of the strain from the draft timbers and body bolster and convey it direct to the center sills above, by means of stop castings and a filling timber between the center sills, running from the end sill back beyond the body bolster. The stop castings are framed into this upper timber and into the draft timbers, transverse bolts and tie plates at the bottom of the draft timber, binding the whole together.

The foregoing are all illustrations of types of gear extensively used. There are drawings of variations of these before us, but we use these as representing their



F

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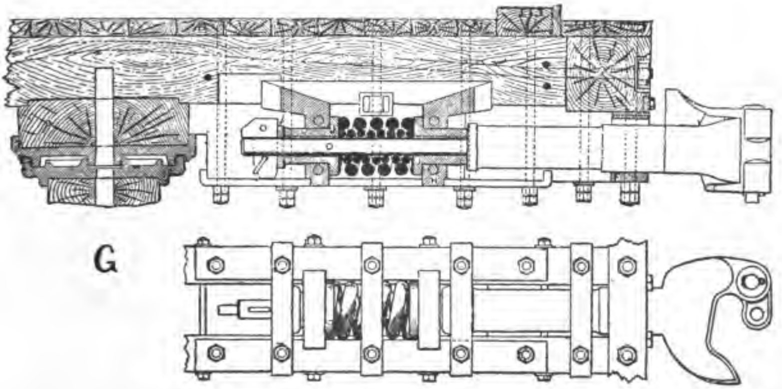
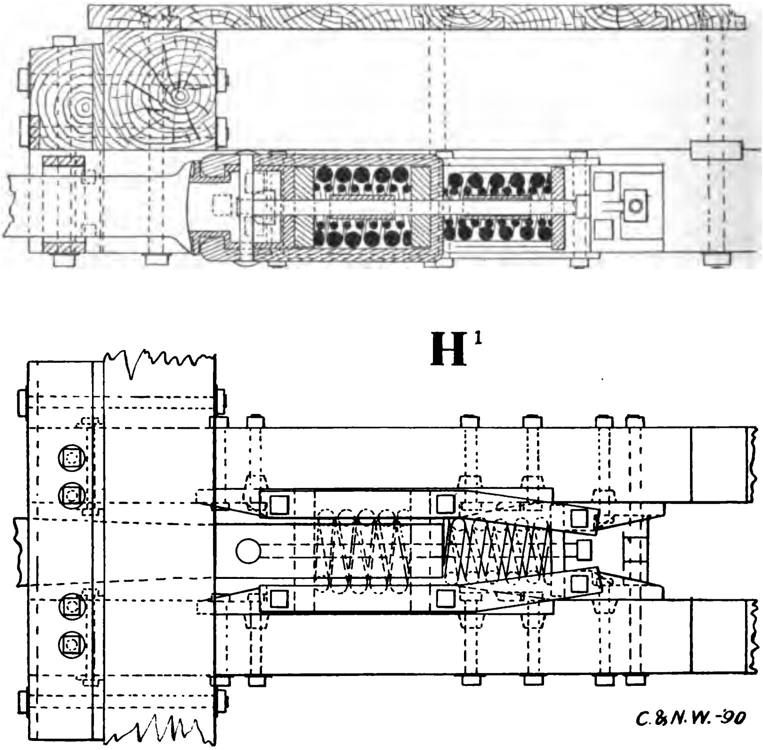


G

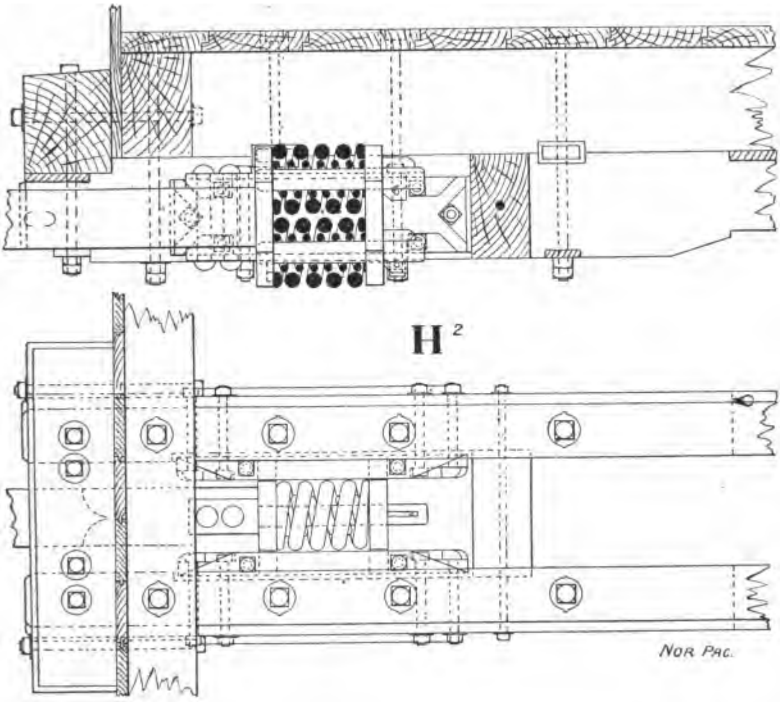
PA. - '92.

class. Some of them show the tail bolt for attaching the coupler, but all can be used with the yoke, we are informed.

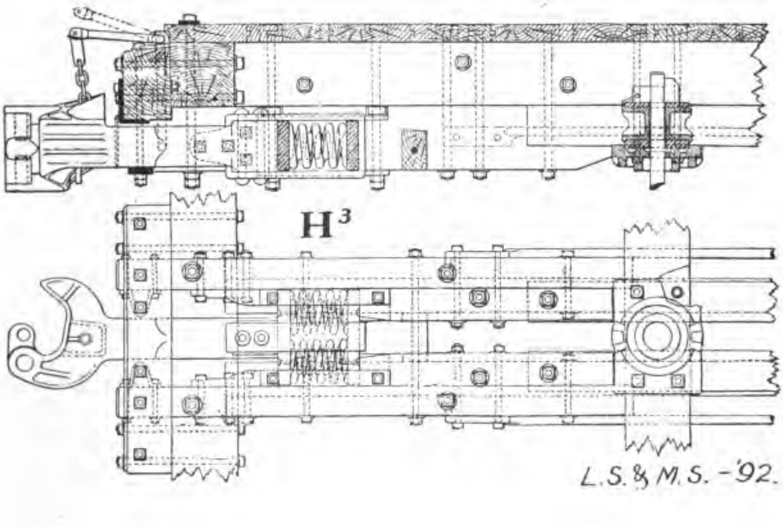
In all of the above types, the designers have attempted an improvement upon the old style single spring type. The illustrations H^1 H^2 H^3 show designs in which the attachment has been made more secure than in the original recommendation, and in which the spring resistance has been increased by using two springs.



H^{1}

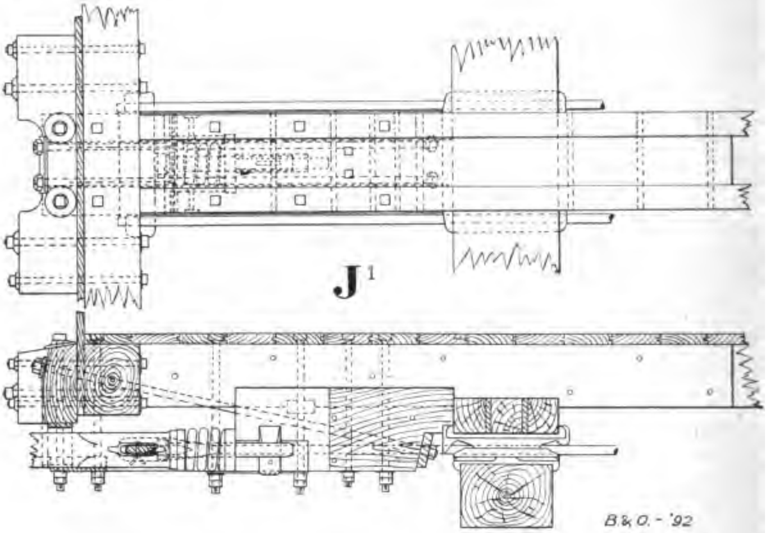


H^2

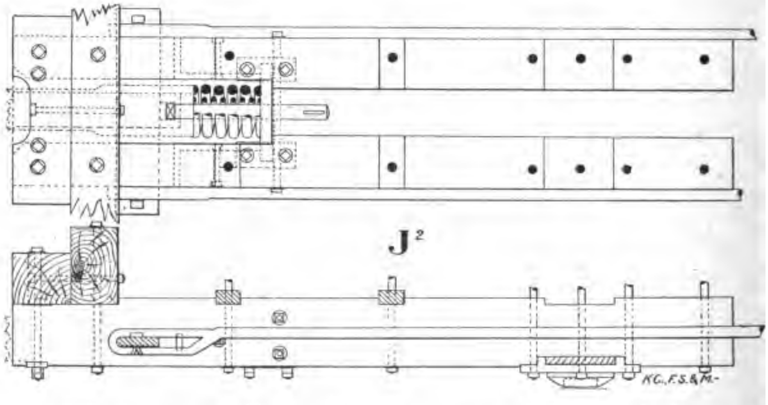


H^3

In all of the foregoing designs, more attention has been devoted to the resistance of buffing strains, which, of course, are the more severe. J^1 J^2 J^3 illustrate designs in which an attempt has been made to improve the attachment in relation to the draft.



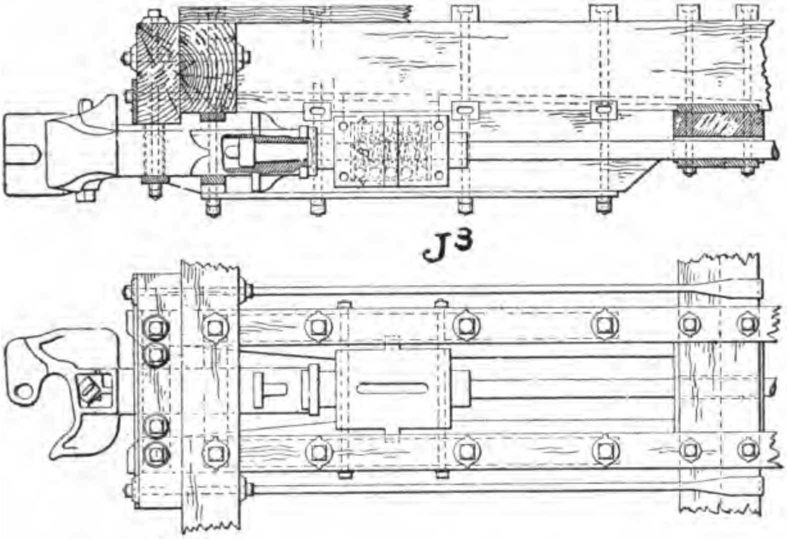
J¹



J²

All the designs so far illustrated, are improvements of the old under-hung style. K^1 K^2 K^3 illustrate a more radical departure from the recommendations. They attempt to place the draft gear directly in the line of draft and in the line of the greatest resistance, by attaching the couplers between the center sills, as clearly shown in the drawings.

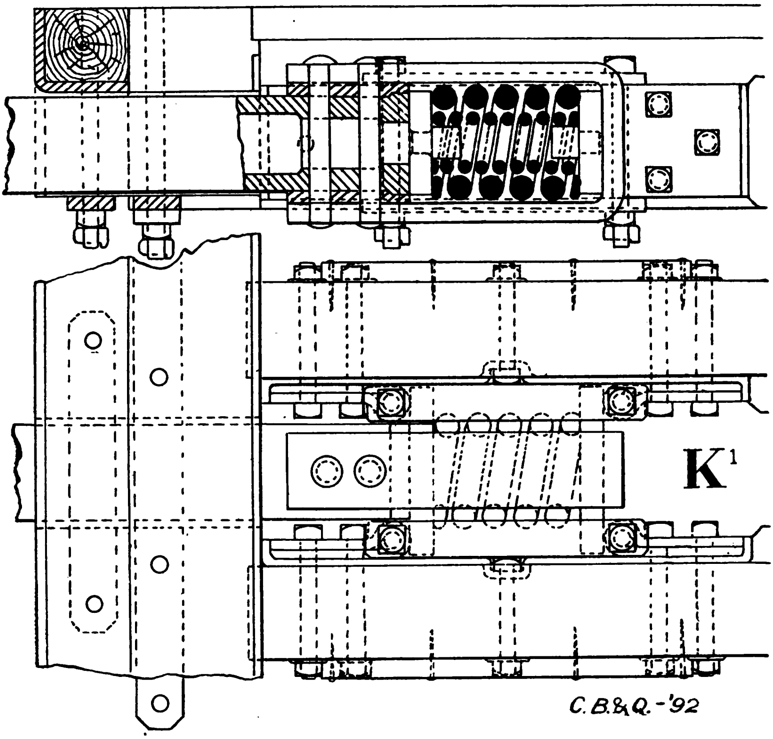
Having now shown the great variation in the practice of the members of the Association in relation to the attachment of couplers to cars, it is apparent to your committee that any recommendation of a standard for wooden construction would be impracticable. We believe, however, that as the greater number of members use some modification of the old recommended practice, and as these recommendations are consulted more or less by private car owners and builders, it would be more creditable to the Association to substitute a design of greater strength and more in accord with modern practice. With this in view, we present the design shown in Fig. *C* for adoption as recommended practice. (See end of report.)



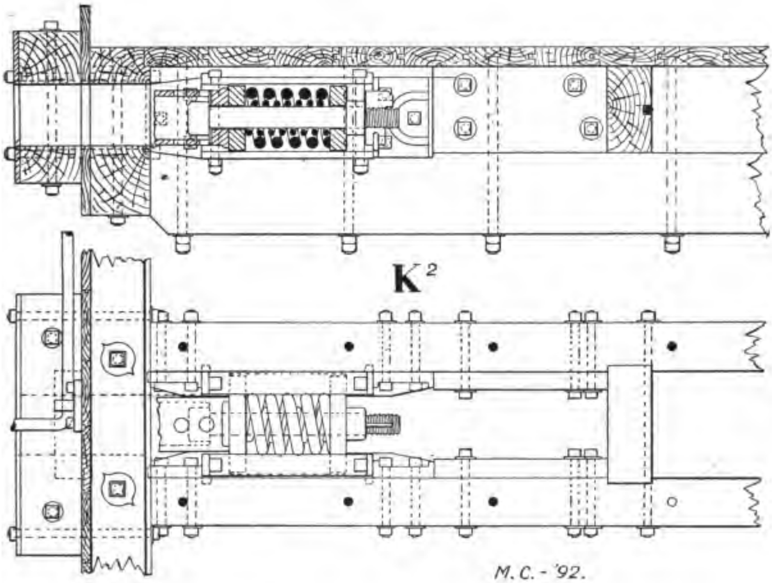
J3

CENT. OF GA. - '92

In this design, we have attempted to keep somewhat in the line of the old recommendations, but have also attempted to incorporate the best of the unpatented improvements as shown in the various drawings submitted by members. We have increased the resistance of the drawbar stops to buffing blows, by backing them up with timber carried back to, or through, the bolster. We have increased the resistance of the front drawbar stop to pulling strains by backing it up with solid timber running to the front end of the draft timber. We have tied the draft timbers together by tie plates and bolts to prevent spreading, and have used anchor blocks and bolts in sufficient number and size, to secure the draft timbers to the upper structure more securely. The spring, yoke, followers and stop are shown in detail. We have also attempted to strengthen and improve the plate taking buffing blows from the horn of the coupler, as shown.

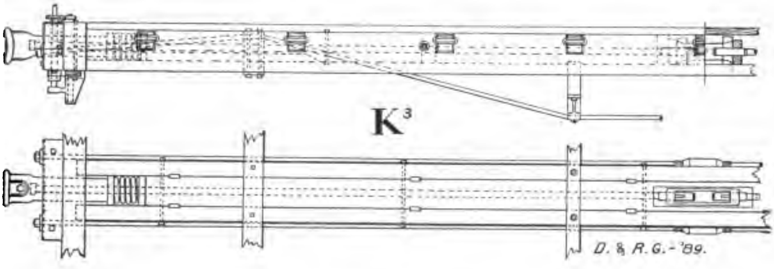

K¹
C.B.&Q.-'92

When metal sills come into use, it might be possible on account of the changes which will be necessary in the draft gear of most companies, to arrive at some standard.



K^2

M. C. - '92.



K^3

D. & R. G. - '89.

The differences of opinion between the continuous and non-continuous draft gear advocates will disappear by reason of the material, which will render them all practically continuous. The differences between the under-hung and the direct designs (Figs. K^1 K^2 K^3) will disappear, as it will be possible to have a deep center channel or beam which will give us direct draft, continuous buffing advantages, relief from the looseness and slack resulting from the under-hung separate draft timber, green wood construction, and gain the advantages of K^1 K^2 K^3 while maintaining the regular height of platforms, etc., of the country. We would also be able to use standard height double buffer blocks, which users of K^1 K^2 K^3 would not.

and as there are now over a million cars existing at approximately a standard height, this is important.

The complicated, heavy and expensive attachments now in vogue would then be abandoned, as they would be unnecessary, and as the characteristics of the material would forbid us taking the heavy shocks of the buffing blows, metal on metal, through the ends of the couplers and the attachments, we would be compelled to cushion them on wooden end sills or blocks, through the horn of the coupler, or, if that cannot be done successfully, through double buffer blocks.

We believe the time for the substitution of metal sills is approaching, and that now is the time for investigation to begin in regard to the recommendation of a standard draft rigging.

The following is a summary of the recommendations made by your committee in the foregoing report:

1. The adoption of a standard for recommended practice in the method of attaching M. C.-B. couplers to cars, and the adoption of standards for (*a*) drawbar yoke, (*b*) drawbar stop, (*c*) follower, (*d*) front carrier iron, as shown in Fig. *C*.

2. The adoption of standard buffer blocks and locations for same; also change in dimensions of dead-woods for use with M. C.-B. couplers as shown in Figs. *G*, *H* and *I*.

3. The adoption of a standard draft spring, 6¼ inches diameter, 8 inches long, with 22,000 pounds capacity and 2⅛ free motion.

4. The adoption of a standard form of tail-end, as shown by either Fig. *A* and Fig. *B* or by Fig. *B* alone.

Respectfully submitted,

E. D. BRONNER, Chairman;
W. H. HARRISON,
A. M. WAITT,
WILLIAM GARSTANG,
A. DOLBEER,
J. H. DAVIS,
Committee.

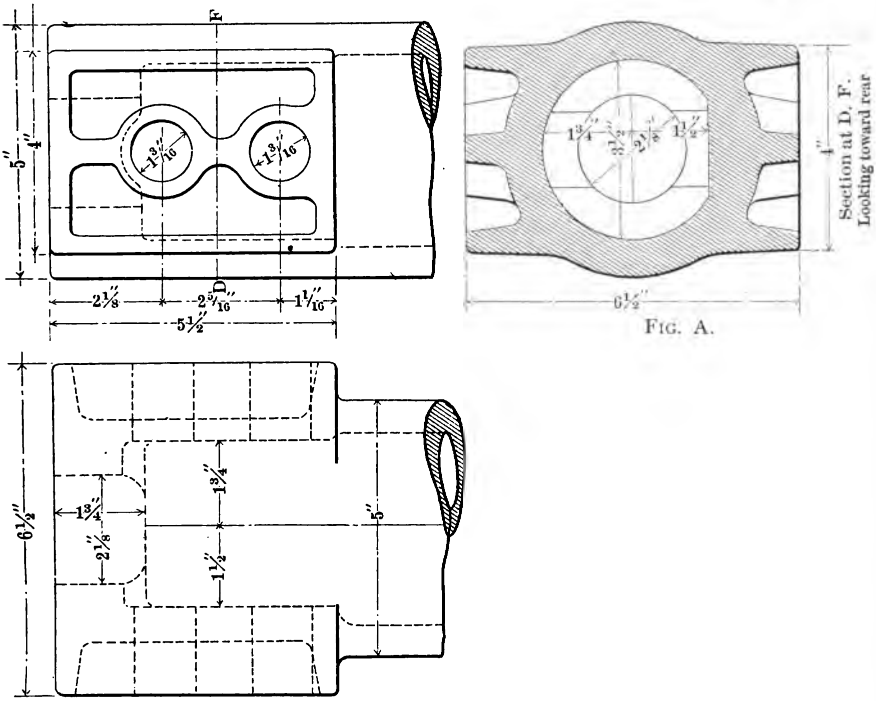

F
D
5"
4"
$1\frac{3}{16}''$
$1\frac{3}{16}''$
$2\frac{1}{8}''$
$2\frac{5}{16}''$
$1\frac{1}{16}''$
$5\frac{1}{2}$
$6\frac{1}{2}''$
$1\frac{3}{4}$
$2\frac{1}{8}''$
$1\frac{3}{4}$
$1\frac{1}{2}''$
5"
$1\frac{3}{4}''$
$3\frac{1}{2}$
$2\frac{1}{8}$
$1\frac{1}{2}''$
4"
$6\frac{1}{2}''$
Section at D. F.
Looking toward rear

FIG. A.

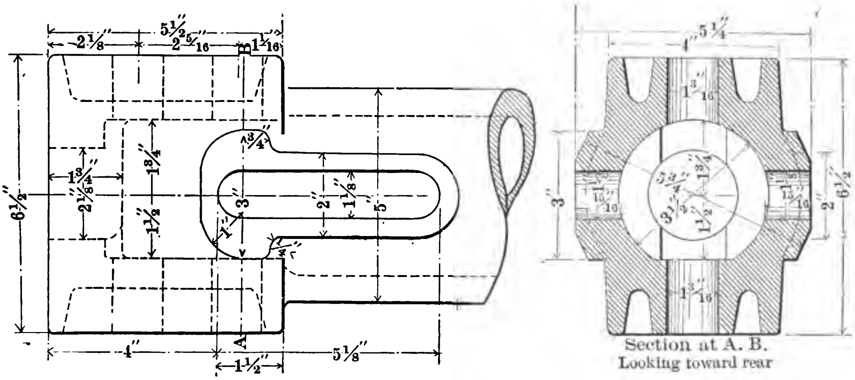
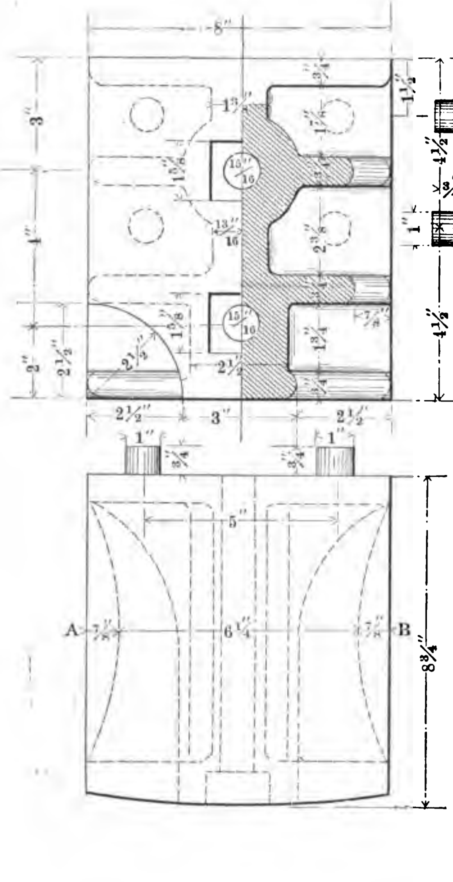

$5\frac{1}{2}''$
$2\frac{1}{8}''$
$2\frac{5}{16}''$
$1\frac{1}{16}''$
B
$6\frac{1}{2}''$
$1\frac{3}{4}''$
$2\frac{1}{8}''$
$1\frac{3}{4}$
$1\frac{1}{2}$
$\frac{3}{4}''$
3"
2"
$1\frac{1}{8}''$
5"
1"
$\frac{1}{4}''$
A
4"
$1\frac{1}{2}''$
$5\frac{1}{8}''$
$5\frac{1}{4}$
4"
$1\frac{3}{16}''$
3"
$1\frac{15}{16}$
$1\frac{15}{16}$
$3\frac{3}{4}''$
$1\frac{3}{4}$
$3\frac{1}{2}$
$1\frac{1}{2}$
2"
$6\frac{1}{2}''$
$1\frac{3}{16}''$
Section at A. B.
Looking toward rear

FIG. B.


8″
3″
4″
2″
2½″
1¾″
1½″
1⅝″
15/16″
13/16″
1⅞″
2⅜″
1¾″
⅞″
¾″
2½″
2½″
3″
2½″
1″
1″
¾″
¾″
5″
A
⅞″
6¼″
⅞″
B
8¾″

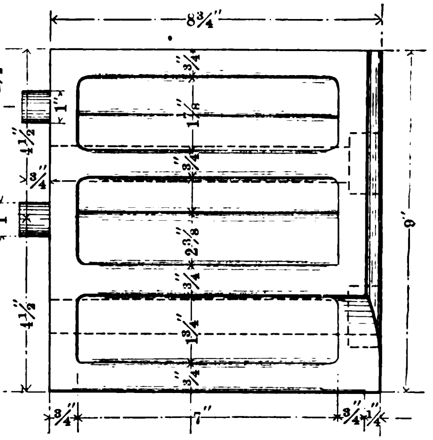

8¾″
¾″
1⅞″
¾″
2⅜″
¾″
1¾″
¾″
1″
4½″
¾″
1″
4½″
9″
¾″
7″
¾″
¼″

FIG. G.

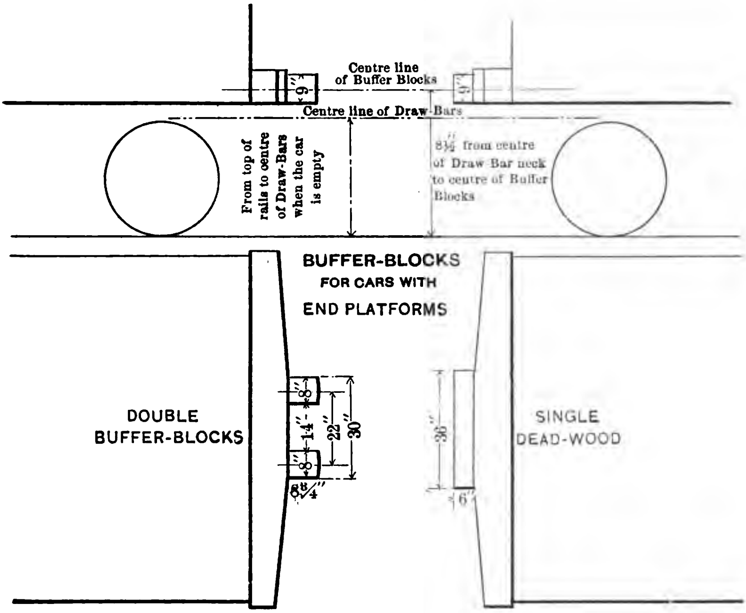

Centre line of Buffer Blocks
9"
9"
Centre line of Draw-Bars
From top of rails to centre of Draw-Bars when the car is empty
8½" from centre of Draw-Bar neck to centre of Buffer Blocks
BUFFER-BLOCKS
FOR CARS WITH
END PLATFORMS
DOUBLE
BUFFER-BLOCKS
8"
14"
8"
22"
30"
8¾"
36"
6"
SINGLE
DEAD-WOOD

Fig. H.

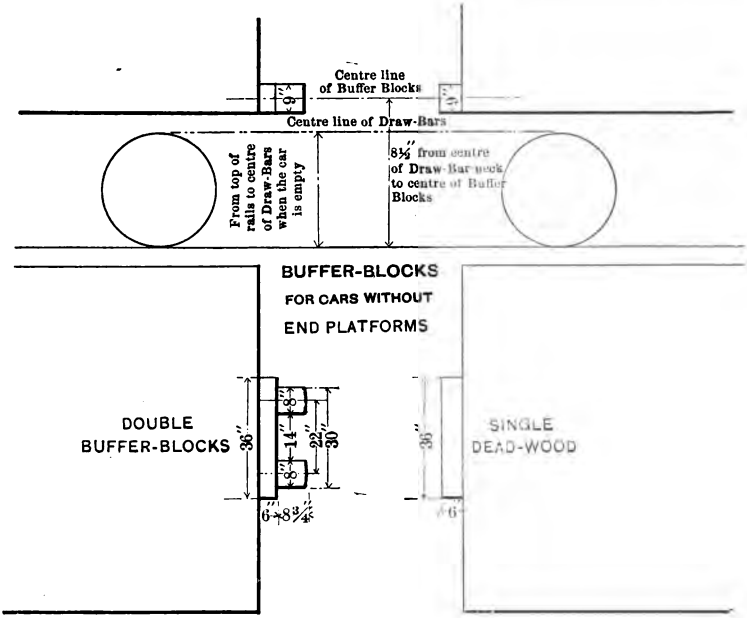

Centre line of Buffer Blocks
9"
9"
Centre line of Draw-Bars
From top of rails to centre of Draw-Bars when the car is empty
8½" from centre of Draw-Bar neck to centre of Buffer Blocks
BUFFER-BLOCKS
FOR CARS WITHOUT
END PLATFORMS
DOUBLE
BUFFER-BLOCKS
36"
8"
14"
8"
22"
30"
6"
8¾"
36"
6"
SINGLE
DEAD-WOOD

Fig. I.

Mr. Marshall: I move that the report be accepted and the committee discharged, and that the recommendations as to change of standards be submitted to letter ballot.

Mr. Sanderson: I would like to ask for some information in respect to the report. On page 15, last paragraph, the committee say: "We believe that the use of double buffer blocks does not interfere with the practical operation of the M. C.-B. coupler." On page 13 they say: "Your committee has also made some experiments, and finds no difficulty in making couplings under any circumstances in connection with curves as sharp as thirty-eight degrees." Cannot the committee say absolutely rather than that they believe? If they could it would set the question at rest in many people's minds. In respect to the drawings of the tail-end on page 32, I would like to ask if there has been any weakness shown in recent coupler tests caused by the slot that is of any material consequence? If there is not I would like to suggest as an amendment to the motion before the house that the form B be adopted as a standard, so as to get rid of the two tail-ends shown in A and B both. I would like also to ask about the doubling over of the tail strap. We have had a great deal of trouble with that lip opening out. Is it necessary to double it clean on itself and weld it and pass the bolt right through the double portion? That would make a much stronger job. As regards the dead-block recommended, right where dead-blocks are bolted to the end sills, especially in gondolas, the brake shaft goes through the end sill. There are two bolts through the end sill for carrying the carrying irons. There are two bolts for the straps that hold the sills to the end sill, and nearly all the wood is cut away. Is it necessary to bore four additional holes for the dowels? Would not the two bolt holes be sufficient? It would save the weakening of the sills.

Mr. Bronner: In answer to the question which the gentleman asks I think that the committee can say that they know that the couplers can be coupled under all conditions on any curve that they will meet in yards—ordinary curves. We know that we have coupled the couplers that have been in use for several years where the gear has been driven back; we have coupled them on curves as sharp as thirty-eight degrees, determined by engineers, and we found no difficulty. I might say that in coupling on a curve as sharp as that we could only couple such couplers as had provision made for coupling on sharp curves. We simply attempted to show that the buffer blocks did not interfere on curves of that degree; but the ordinary M. C.-B. coupler would not couple there. The locks would not act unless there was some provision made for coupling on curves. But in a general way the committee will say that they know that the buffer blocks will not interfere with the action of the coupler on curves. As to the second question, your committee notified the committee on tests of the action they intended to take and asked for information so that it could be incorporated into our report. But we received no information whatever from the committee on tests and so were unable to answer that question. But in the mind of the committee, as there was comparatively a small number of roads using that style of coupler, we thought it undesirable to incorporate that slot into all couplers, and have therefore shown two designs and would prefer the adoption of the two. We do not know of any weakness that will arise from that. But there might be a possibility of weakness arising from that slot. As to the third point, we find that there are quite as many of the members who are using the yoke without any bend whatever as there are using the yoke with the bend at the end—a straight piece, no bend at all; and some of the committee were of opinion that the bend was of no practical value, but others of the committee thought it might be of benefit, and we therefore have shown it, as it certainly can be no detriment to the yoke. Some of us thought that the two ⅞-inch rivets would certainly hold the yoke to the coupler. As to the dowels, I presume that point might be considered as well taken. But we find on examination of the double buffer blocks we have seen around in yards that a great many of them were used and skewed around in all shapes. We simply put on the four dowels as an additional safeguard. But on account of the use of two bolts I think the point is well taken that two dowels only might be used. Of course where a wooden dead-block is used to receive the iron blocks it would not make any difference. But, as the gentleman says, in the cases where the iron buffer block is placed on the end sill it might possibly weaken the timber.

Mr. Lewis: I seriously question the accuracy of the statement of the committee about their coupling the M. C.-B. coupler with a dead-block on a thirty-eight degree curve, if they are constructed according to the standards. We know that at the present time it frequently happens that cars with the M. C.-B. drawbars, on the ordinary needs of a switch, will not couple. On a curve of fifteen degrees it sometimes becomes necessary to pull out the cars on a straight track before we can make coupling. When we interpose the dead-blocks it has a tendency to hold the drawbars much farther apart than it would without them, on a curve, and I for one would like to see the committee present a drawing, if we had a blackboard here, of a car with the dead-block attachments on a curve of thirty-eight degrees. I would like to see how those drawbars would go together.

MR. BRONNER: I presume the reference made by Mr. Lewis is to the couplers. Possibly the couplers would not couple, but we found that if the couplers had been able to couple on that degree of curvature, the dead-blocks would not have interfered. Most couplers would not couple on that curve. But we found the couplers that had a provision made for coupling on curves, that is that would lock before the knuckle had swung completely back, would couple.

MR. SANDERSON: I would like to ask if the distance from the inside of the knuckle on these couplers to the face of the dead-block is the same as the standard?

MR. BRONNER: No, sir. It was less than a standard. The drawbars were old and had been driven back.

MR. WAITT: I would say that when I was first told by the chairman of the committee that couplers would couple with the dead-blocks as represented in the report on a sharp curve, a curve like a thirty-eight degree curve, I was very incredulous. In fact I would not believe it at all until I saw it and had it tried to my own satisfaction over and over and over again. Taking cars that we measured and found were very near the standard, and then some that were nearly an inch out from the standard—that is an inch which would be working against their coupling instead of to their advantage in coupling—we found the only difficulty was with couplers that could not be coupled whether they had dead-blocks on or not, on any sharp curve. But the dead-blocks had nothing to do with interference. In fact, they did not come in contact on the curve as sharp as that until the couplers had got together where they could lock perfectly.

MR. MITCHELL: I will say that we have used dead-blocks on all our cars for years and we have never experienced any trouble on any curve that we have on the road, so far as I know, in coupling the cars on curves. If we have had I have never heard of it.

MR. MACKENZIE: I would like to bring up a question, Mr. President, in respect to the third recommendation of the committee—

"The adoption of a standard draft spring 6¼ inches diameter, 8 inches long, with 22,000 pounds capacity and 2⅛ inches free motion." I wonder if the committee considers that we can get enough steel in that space to make a 22,000-pound capacity spring.

Mr. Bronner: We submitted specifications to prominent spring manufacturers, and found that we could.

Mr. Mackenzie: It is a very singular thing that the springs we are using today with 18,000 pounds capacity are identical with these mentioned. We cannot close it in any, because we are required to have that 2⅛-inch hole for the tail-bolt. I do not understand how they are going to get more steel in there unless they cut off the free motion. You have got to have more steel to increase that 4,000 pounds.

Mr. Bronner: We have not considered a tail-bolt. We have not specified any size for the hole. We are aware that possibly we may not be able to get a hole of large enough size to get a tail-bolt through. But the committee is of opinion that the tail-bolt should not be considered, as it is soon to be a thing of the past.

Mr. Adams: Why not use a twin spring as was represented here on page 26? We could get the additional power of the spring there without any trouble.

The President: Mr. Sanderson's amendment, I believe, was not seconded. The original motion is that the report be accepted, the committee discharged and recommendations 1, 2, 3 and 4 be submitted to letter ballot during the coming year.

The motion was carried.

The President: It is now about 12 o'clock by eastern time, which is the hour for the discussion of special subjects. If there are any subjects to be brought up by any of the members, we would be glad to hear from them.

Mr. McGee: I would like to inquire who is responsible for a car destroyed by a cyclone, whether it is the owner of the car or the road on which the car is destroyed?

The President: That is a pretty knotty question. It has been up before a good many roads. I do not know whether the Arbitration Committee has ever considered it or not. Mr. Rhodes, can you give Mr. McGee any information on that subject?

Mr. Rhodes: I should certainly think the road which the car is on is responsible. The idea of the Association's rules is to facilitate cars getting off their lines. Now, if there were no rules and cars did not get off their lines and a cyclone passed over a railroad company's territory, whose car would be destroyed? Of course its own. But a foreign car is on. that line at the time and it is there as that company's own car, and the line on which the cyclone occurs is responsible for the car that is damaged on that line, I should say.

Mr. McGee: That is my opinion. I only inquired to see if others agreed with me.

Mr. Mackenzie: While it may be the rule of the Association or the opinion of the chairman of the Arbitration Committee that such is the case, I believe that there would be legal objections coming in there. I have had personal experience with cars being destroyed on the line that I was connected with by a cyclone and the owners were held responsible for the car, under a legal decision, as an act of Providence.

Mr. Sanderson: I would like to ask what the difference is between a cyclone and a washout. We are all responsible for a washout. I think the cases are parallel.

Mr. Mackenzie: Perhaps the courts would decide against the washout, too, if they had such a case.

Mr. Adams: It seems to me that a washout and a cyclone are quite different. The cyclone is certainly a providential act. For a washout a railroad might be entirely responsible for not making their culverts with sufficient water-way. We cannot make provision for a cyclone, but we can make provision for the water flowing away.

Mr. Lewis: It seems to me that Mr. Rhodes puts the matter quite plainly — that if it were the car of the company which the cyclone damaged that was occupying the position of this foreign car, it would result in the company's loss, and I do not see how we can make any distinction between destruction by a cyclone and damage by lightning and damage by washout. The car is in the possession of the company, and any damage that results while in its possession, I think, it is responsible for and not the owner.

The President: Rule 2 seems to cover the question: "Cars must be delivered in good running order and returned in as good general condition as when received." The road having a foreign car cannot deliver it in good general condition if it is destroyed by a cyclone. They must return it or pay for it.

Mr. J. B. Allen: I would like to ask in the case of a vertical coupling being worn out, if it would not be proper that they should be classed with brake shoes and brasses—that owners be responsible for new knuckles put in, in case of worn-out knuckles.

No one volunteered to discuss it.

The President: We will now take up the seventh committee—Metal for Brake Shoes. I would like to state, in regard to this committee, that all three members who were appointed on the committee seemed to think that it required so much work that it was impossible for them to serve. So Mr. Cloud, the secretary, has procured all the information he could get on the subject, so as to have a report for the convention this year, which report he will now read.

Mr. Cloud read the following report:

REPORT ON METAL FOR BRAKE SHOES.

To the President and Members of the Master Car-Builders' Association:

The Executive Committee appointed a Committee on Metal for Brake Shoes to investigate the relative friction and wear of different metals and different shoes in general use on chilled wheels and on steel tires, to report to the convention in 1893. As the committee did not meet or make any investigations, and when it became evident at a late date that there would be no report on this subject from the committee, the President of the Association instructed the Secretary to invite information from the members and compile a report on this subject therefrom.

It was impossible, under the circumstances and at the late date when this matter was taken in hand, to make any investigations for the purpose of this report, and its scope is therefore confined largely to a statement of the matter as it now stands, with some additional information which it is hoped will show to members the importance of investigating the subject and induce more detailed inquiry in the early future.

In 1890 the committee on this subject reported progress through its Chairman (see pages 35, 36 and 37 of the Proceedings for that year). The committee was continued, and it made a report in 1891 (see pages 59 to 68 in the report for that year), in which were detailed the results of some shop tests made by the Chicago, Burlington & Quincy Railroad Co. on small wheels and with small shoes. The committee was again continued but it did not report any additional facts in 1892, but recommended that the committee be discharged and the subject turned over to a new committee (see page 87 in report for 1892).

As the new committee was unable to inaugurate the investigations desired, it seems that some arguments might be properly presented to the Association to show the importance of investigations on this line at this time, and the following is submitted with that intent:

In order to give some idea of the importance of this question from the standpoint of metal actually used in brake shoes per year, and entirely aside from the relative value of one metal or another in the service performed, some statistics have been collected from the various roads to show the annual consumption of metal for brake shoes on cars and engine tenders. While these statistics are not entirely accurate, they are nearly enough so for the present purpose. Some roads have reported the actual pounds of brake shoes procured in the calendar year 1892, while others have reported the number of shoes; by taking the average weight per shoe as 21 pounds and reducing all to weight, we find that roads which were represented in the Association in 1892 owning 320,000 cars, procured in the year 1892, approximately, 32,000,000 pounds of brake shoes for use on cars and engine tenders, or an average of 100 pounds per 8-wheel car represented per year.

If we extend this ratio to all the cars represented in the Association, or in round numbers to 1,100,000 cars, we will find that the annual requirements for brake shoes for cars and engine tenders owned by roads represented in the Association by representative members, is 55,000 tons. It may be said that approximately two-thirds of this metal is worn out in service and that the other one-third is returned as scrap, although this estimate of the average scrap weight is an estimate based on general knowledge, and not on any absolute statistics.

To show that the roads reporting are representative roads throughout the country, it may be said that the 320,000 cars reported on are owned by such roads as the Union Pacific, C. & N.-W., C. B. & Q., Penna. Co., Penna. R. R., L. S. & M. S., B. & O. R. R., E. T. V. & G., N. & W., O. & M., Wil. & Weldon., N. Y. O. & W., and a number of smaller lines throughout the country.

It may also be added that of the total amount, 32,000,000 pounds reported by the roads reporting, five-sixths of the total used was reported as cast-iron, while approximately one-sixth was reported as Congdon, and a small number of the shoes of some different manufacture and under special names.

Most of the roads reporting as above also reported their consumption of driver brake shoes for the year, which were of different kinds, but which aggregated a total of 41,000 brake shoes, which average in weight about 50 pounds each, which would make 1,025 tons of driver brake shoes used by roads owning about one-fourth the cars represented in the Association.

Referring to the shop test made by the C. B. & Q. R. R. Co. and reported in the Proceedings of 1891, it seems hardly desirable to repeat here the results of these tests, for while they had their particular value at the time, the report of 1892 says that " investigations have convinced the committee that accurate conclusions from the shop tests would not be warranted without road tests," and as the shop tests have been reported in detail and the principal conclusions can be had by reference to the report of 1891, these tests will not be further considered at the present time.

It is perhaps correct to state, that notwithstanding the use of wooden brake shoes in England until a comparatively recent date, the earliest valuable results of experiments on friction of metal brake shoes were presented by Capt. Douglas Galton to the Institution of Mechanical Engineers of Great Britain some fifteen years ago. The experiments were made with steel-tired wheels, and the results show very clearly the intricate character of the question of brake shoe friction under variable conditions of service in railway trains. In support of this statement, the following table of coefficients of friction at varying speeds with the cast-iron brake blocks on steel tires is given from a paper read by Captain Galton before the Institution of Mechanical Engineers of Great Britain in April, 1879.

Number of Experiments from which the Mean is taken.	VELOCITY.		CO-EFFICIENT OF FRICTION.		
	Miles per Hour.	Feet per Second.	Extremes observed.		Means.
			Maximum.	Minimum.	
12	60	88	.123	.058	.074
67	55	81	.136	.060	.111
55	50	73	.153	.050	.116
77	45	66	.179	.083	.127
70	40	59	.194	.088	.140
80	35	51	.197	.087	.142
94	30	44	.196	.098	.164
70	25	36½	.205	.108	.166
69	20	29	.240	.133	.192
78	15	22	.280	.131	.223
54	10	14½	.281	.161	.242
28	7½	11	.325	.123	.244
20	Under 5	Under 7	.340	.156	.273
....	Just moving.	Just moving.	....	....	.330

It will be seen that the co-efficient of the friction is not only variable through a large range under the same speed, but that it varies very greatly with the speed under these conditions, increasing as the speed decreases.

It was also found that the co-efficient of friction decreases rapidly with the increase of time that the shoes were in action upon steel-tired wheels when there was no reduction in the speed, as shown in the following table of co-efficient of friction as affected by time, also reported by Captain Galton from a smaller number of experiments.

SPEED.	Commencement of Experiment.	CO-EFFICIENT OF FRICTION.			
Miles per Hour.		After 5 Seconds.	After 10 Seconds.	After 15 Seconds.	After 20 Seconds.
20	.182	.152	.133	.116	.099
27	.171	.130	.119	.081	.072
37	.152	.096	.083	.069	....
47	.132	.080	.070	....	....
60	.072	.063	.058	....	....

It must be remembered that all the experiments above reported by Captain Galton were made with cast-iron brake blocks, on steel-tired wheels, which is not a condition prevailing generally in the practice of this country, except on many passenger trains, but it becomes an important question to know whether similar variations are had with iron shoes on chilled cast-iron wheels, especially as our service is such that shoes of the same kind are frequently used indiscriminately on both chilled and steel-tired wheels.

The most reliable results obtained experimentally by the use of different shoes on chilled wheels and with different brake arrangements at the present time in hand, are those obtained by the Pennsylvania R. R. Co. (which furnishes the information) in various tests conducted during the past two years, which tests had different objects in view, as follows:

First. A comparison of retarding power with one brake shoe per wheel and with two shoes per wheel with the same aggregate pressure applied to the wheel in each case.

Second. A comparison of retarding power with long and short shoes with one brake shoe per wheel in each case.

Third. A comparison of retarding power with uniform pressures by the use of cast-iron, composite and three different grades of cast-steel shoes.

Fourth. A comparison of the durability of these cast-iron, composite and steel shoes in continued service; also, incidentally, the relative wear of the wheels under these different shoes.

Considering these in the order above mentioned:

First. Figs. 1 and 2 show the brake rigging on one 4-wheel truck in these tests, Fig. 2 showing the ordinary method used with one brake shoe per wheel, and Fig. 1 showing two brake shoes per wheel, which is standard on the car used for these tests.

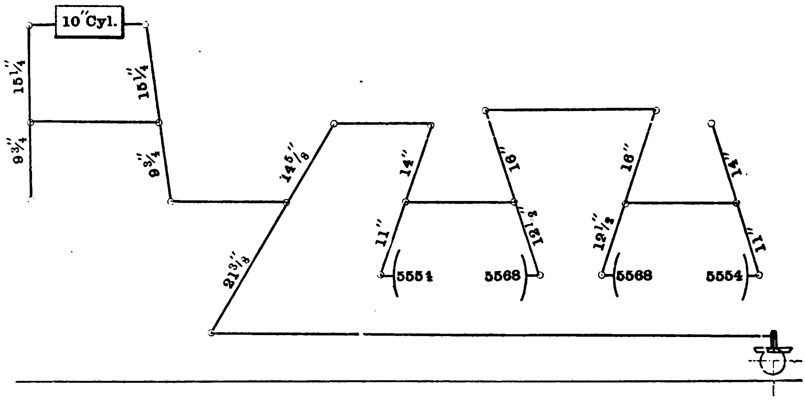


FIG. 1.

The tests were made on a uniform grade of about 80 feet per mile, with three cars, two of which were passenger cars and the other a dynamometer car placed between the two. The three cars together weighed about 130,000 pounds. The run was made by gravity and the start by releasing the hand brakes on the forward passenger car and on which alone the air brake was used to stop the three cars by opening the conductor's valve. The train of three cars was allowed to run a distance of one mile by gravity with the brakes released, and the time was taken by stop watches at the start and the end of one mile to check the uniformity of the speed attained in the different tests. On passing the one-mile post the air brakes were applied, as already explained, to the forward car only, with the other two cars pushing, and the time and distance required to make the stop were taken and the speed was recorded by the dynamometer car. The sliding of the wheels was noted by an observer at each end of the car which was braked. The condition of the rails was dry during the trials, but the wind, which was light, was in different directions and of different velocities on different days.

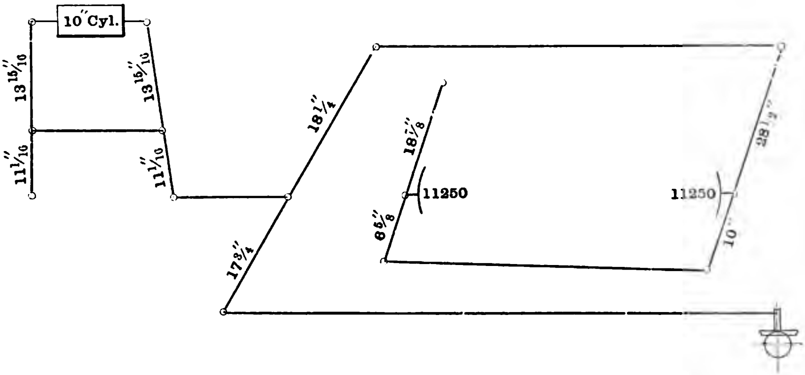


FIG. 2.

Statement No. 1 gives the details of the trials made to compare the use of one brake shoe per wheel with two brake shoes per wheel, all using long shoes. The sliding of the wheels was somewhat more with two shoes per wheel, but it was mostly on the last pair of wheels. It will be noted that there is practically the same efficiency in these two methods of braking.

TRIALS WITH BRAKE GEAR AS PER FIG. 1 AND 16 LONG SHOES.

STATEMENT No. 1.

60 LBS. AVERAGE PRESSURE IN CYLINDER—90 PER CENT OF WEIGHT BRAKED.

No. of Trip.	Speed of Train on application of Brakes.	Air Pressure in Reservoir.	Air Pressure in Cylinder immediately after application.	Air Pressure in Cylinder at stop.	Average Pressure on Piston.	Piston Travel.	Length of Stop.	Time of Stop.		Wheels Slid.				Power applied to Wheels based on average pressure in Cylinder.	REMARKS.
								Min.	Sec.	1st Pair.	2d Pair.	3d Pair.	4th Pair.		
1	35.2	77¾	61	57	59	8¾″	1048	0	36⅕	0	2″	0	6′	43732	....
2	35.4	80	63	60	61½	$8\frac{13}{16}$″	1052	0	36	0	8″	3′	6′	45600	....
3	36.4	79	62	59	60½	$8\frac{27}{32}$″	1053	0	35⅖	0	4″	0	4′	44844	....
4	35.8	78½	61½	58	59¾	8⅞″	1096	0	37	0	0	1′	4′	44310	....
5	36	78½	61½	57½	59½	8⅞″	1074	0	35⅘	0	6″	1′	5′	44087	....
6	35.8	80½	62½	60	61¼	9¼″	1010	0	34⅕	0	4″	0	15′	45422	....
7	37	79	62	57½	59¾	9⅛″	1115	0	36⅘	0	6′	5′	10′	44310	....
8	35.4	78	61	56	58½	9⅛″	1039	0	35⅘	0	2″	1′	20′	43375	....
9	34.6	78½	61½	56	58¾	$9\frac{1}{16}$″	979	0	34⅖	0	4″	0′	10′	43553	....
Avg's.	35.7	78⅞	61¾	58	59⅞	$8\frac{13}{16}$″	1052	0	35⅗	0	11¼″	16″	9′	44359	....

TRIALS WITH BRAKE GEAR AS PER FIG. 2 AND 8 LONG SHOES.

10	35.4	81¼	61¼	58	59⅝	$10\frac{9}{32}$″	1050	0	35⅘	0	2′	6″	5′	44716	....
11	35.8	82	61½	58	59¾	10⅛″	1110	0	36⅘	1″	1′	1′	3′	44820	....
12	36.5	82	62	58	60	$10\frac{5}{16}$″	1136	0	37⅕	8″	2′	5″	1′	45000	....
13	35.8	82	61½	58	59¾	$10\frac{9}{16}$″	1095	0	37⅕	0	4′	1′	1′	44820	....
Avg's.	35.9	81¾	61½	58	59¾	$10\frac{5}{16}$″	1098	0	36⅖	2″	2′	9″	2½′	44820	....

TRIALS WITH BRAKE GEAR AS PER FIG. 2 AND 8 LONG SHOES.

STATEMENT No. 2.

60 LBS. AVERAGE PRESSURE IN CYLINDER—90 PER CENT OF WEIGHT BRAKED.

No of Trip.	Speed of Train on application of Brakes.	Air Pressure in Reservoir.	Air Pressure in Cylinder immediately after application.	Air Pressure in Cylinder at stop.	Average Pressure on Piston.	Piston Travel.	Length of Stop.	Time of Stop.		Wheels Slid.				Power applied to Wheels based on average pressure on Piston.	REMARKS.
								Min.	Sec.	1st Pair.	2d Pair.	3d Pair.	4th Pair.		
1	37.8	73½	56½	51	53¾	9 17/32″	1504	0	49	0	10″	1′	2′	40320	....
2	37.6	72	55	50	52½	9⅝″	1575	0	49⅘	0	4′	1′	2′	39375	....
3	36	71½	55	50	52½	9 13/32″	1339	0	45	0	6′	1′	3′	39375	....
4	36.8	74	56½	52	54¼	9 13/16″	1371	0	44⅖	1″	5′	1′	3′	40680	....
5	37	74	56½	52	54¼	9 9/16″	1466	0	47⅕	0	3′	1′	8′	40680	....
6	37	73¾	56½	50½	53½	9¾″	1537	0	49⅘	1′	8′	5″	3′	40125	....
7	37.2	74	56½	50½	53½	9¾″	1472	0	48⅗	8′	10′	0	3′	40125	....
8	37.4	73¾	56½	50½	53½	9⅝″	1541	0	49⅖	3″	5″	1′	3′	40125	....
9	38.2	73¾	56½	51	53¾	9 21/32″	1541	0	49	0	4′	0	3′	40320	....
Avg's.	37.3	73⅜	56⅛	50⅞	53½	9 21/32″	1483	0	48	1′	4½′	6″	3⅓′	40125	....

TRIALS No. 4 WITH BRAKE GEAR AS PER FIG. 2 AND 8 SHORT SHOES.

10	36.8	70½	55	50½	52¾	8½″	1506	0	48⅗	0	3′	10″	15″	39555	....
11	37	70¼	54¼	50	52¼	8 9/16″	1516	0	49	0	3′	0	3′	39150	....
12	36.6	70¼	54½	50	52¼	8 7/16″	1512	0	49	0	3′	0	10″	39150	....
13	36.6	70	54½	50	52¼	8⅝″	1486	0	49	0	4′	0	3′	39150	....
14	36.2	71	55	51½	53¼	8 7/16″	1308	0	42⅖	0	1′	5″	10″	39937	....
15	37.2	70½	54½	50	52¼	8⅛″	1482	0	48	0	1″	0	1′	39150	....
16	37.4	70½	54½	52	53¼	8⅝″	1328	0	42⅕	0	1′	10″	2′	39937	....
17	37.2	70	54½	50½	52½	8⅞″	1388	0	45	0	5′	5″	2′	39375	....
18	38.4	70¼	54½	50	52¼	9″	1431	0	44⅕	0	7′	1′	4′	39150	....
Avg's.	37	70⅜	54½	50½	52½	8 9/16″	1440	0	46⅖	0	3′	5″	2′	39375	....

Second. The experiments as between long and short shoes were made in the same manner as described above, and the shoes of different lengths show about the same results, as per statement No. 2.

In the two sets of tests (FIRST and SECOND) it was noticed that the riding of the cars during the stop was much better with two brake shoes per wheel than with one brake shoe per wheel, due apparently to the fact that the application of the second brake beam to each pair of wheels partly counteracted the tilting of the trucks caused by the outside suspended beams when only one pair of shoes is used per wheel in this manner.

Third. The experiments on retarding power with uniform pressures by the use of cast-iron, steel and composite shoes with one brake shoe per wheel were made in the same manner as described above, for the first tests, and the details of the various runs in these experiments are given in tables 1, 2, 3, 4 and 5 herewith, in which three different grades of steel shoes were tried, and in which the different grades are designated by the letters "D," "M" and "Z."

The composite shoes consisted of cast iron with a small percentage of wrought iron in the rubbing surfaces extending through the shoes, the percentage of wrought iron being somewhat less than seven per cent of the whole surface.

For a more accurate comparison, each of the runs included in tables 1, 2, 3, 4 and 5 has been reduced to actual retardation in pounds by the brakes during the stop, and the results are given in table "A."

TABLE I.

CAST-IRON SHOES.

No. of Run.	Date of Run.	Time of Running Mile.		Time of Stop after Application.		Wheels Slid Feet.				Air Press. at Time of Application, lbs. per sq. inch.	Cylinder Press. immediately after Application, lbs. per sq. inch.	Cylinder Pressure at Stop, lbs. per sq. inch.	Average Pressure during Stop, lbs. per sq. inch.	Travel of Piston, inches.	Speed at End of Mile, miles per hour.	Distance Run after Application, feet.	REMARKS.
		Min.	Sec.	Min.	Sec.	1	2	3	4								
132	4–22	2	48¼	0	49⅘	0	½	1¼	12	77¼	55	48½	51¾	8½	37.8	1566	....
131	4–22	2	48¼	0	58⅗	0	1	1	12	74	53	47	50	8$\frac{15}{32}$	38	1654	....
9	4–14	3	7	1	4	....	....	....	....	60½	41½	38½	40	9$\frac{1}{16}$	35.6	1805	....
8	4–14	3	10	1	6	0	0	10	10	60	42	39	40½	9	35.2	1806	....
6	4–14	3	0	1	0	....	....	....	....	70	49	45	47	9$\frac{7}{16}$	36	1834	....
130	4–22	2	46½	0	58⅘	0	¼	1	8	70	50	44	47	8$\frac{3}{16}$	38.2	1835	....
129	4–22	2	49	1	0	0	⅓	1	10	70	50	44	47	8$\frac{3}{16}$	38	1870	....
7	4–14	3	14	1	6	....	*	...	....	70½	49½	45	47¼	9$\frac{7}{16}$	35.6	1893	*Pair No. 2 slid all the way.
126	4–21	2	49	1	6⅗	0	0	0	4	59½	42½	37½	40	7½	37.4	2117	....
127	4–21	2	50½	1	8⅖	0	0	0	2	59½	42½	38	40¼	7½	37.8	2181	....
123	4–21	2	48¼	1	8⅕	0	0	1	7	60	44	38½	41¼	7$\frac{9}{16}$	38	2188	....
125	4–21	2	48½	1	8⅕	0	0	0	1	59	42½	36¾	39⅝	7⅜	37.6	2192	....
124	4–21	2	48½	1	8⅘	0	0	0	1	60	43	38½	40¾	7½	37.6	2205	....
128	4–21	2	48½	1	9⅖	0	0	0	1	59½	42½	37½	40	7⅜	37.8	2213	....
122	4–21	2	47½	1	9⅘	0	1	0	2	62	45	39	42	7$\frac{9}{16}$	38.2	2270	....
121	4–21	2	47½	1	11	0	1½	0	3	62	44½	39	41¾	7$\frac{9}{16}$	37.8	2294	....
10	4–14	3	10	1	18	....	....		....	......	......	......	......	......	34.4	2335	Hand brakes.

TABLE 2.

COMPOSITE SHOES.

No. of Run.	Date of Run.	Time of Running Mile.		Time of Stop after Application.		Wheels Slid Feet.				Air Press. at Time of Application, lbs. per sq. inch.	Cylinder Press. immediately after Application, lbs. per sq. inch.	Cylinder Pressure at Stop, lbs. per sq. inch.	Average Pressure during Stop, lbs. per sq. inch.	Travel of Piston, inches.	Speed at End of Mile, miles per hour.	Distance Run after Application, feet	REMARKS.
		Min.	Sec.	Min.	Sec.	1	2	3	4								
68	4–18	2	59	1	9	0	⅙	⅔	15	60	46	40½	43¼	5⅞	35.4	1941	....
191	4–23	2	58¼	1	6	0	1	0	3	58	42½	38	40¼	6⅜	34.6	1954	....
69	4–18	3	1	1	8	0	½	0	20	60	46	40½	43¼	5 13/16	35	1960	....
66	4–18	3	1	1	6	0	1	0	5	60	46	41	43½	5⅞	36.4	1975	....
74	4–18	3	7	1	18	0	¼	0	2	57¼	43¼	38¼	40¾	5 11/16	37.4	2345	....
75	4–18	2	53	1	15	0	1½	0	3	57½	43	38½	40¾	5⅝	37.6	2390	....
71	4–18	2	53	1	26	400	400	0	500	57¼	43¼	38½	40⅞	5⅞	37	2473	Wet rail.
73	4–18	2	58	1	23	0	10	2	10	57½	43¼	38¼	40¾	5 15/16	37.6	2520	....

STEEL SHOES "M."

No. of Run.	Date of Run.	Time of Running Mile. Min.	Time of Running Mile. Sec.	Time of Stop after Application. Min.	Time of Stop after Application. Sec.	Wheels Slid Feet. 1	2	3	4	Air Press. at Time of Application, lbs. per sq. inch.	Cylinder Press. immediately after Application, lbs. per sq. inch.	Cylinder Pressure at Stop, lbs. per sq. inch.	Average Pressure during Stop, lbs. per sq. inch.	Travel of Piston, inches.	Speed at End of Mile, miles per hour.	Distance Run after Application, feet	REMARKS.
22	4–15	2	59	1	1	0	0	0	50	79	57	52	54½	8 3/16	35.6	1836	....
21	4–15	3	0	1	0	0	0	0	25	79	57	52	54½	8 7/16	35.6	1857	....
14	4–15	3	5	1	16	0	0	0	0	61	44½	40	42¼	6⅞	34.8	2325	Heavy head wind.
15	4–15	3	5	1	21	0	0	0	0	57	43	38¼	40⅝	6 15/16	34.2	2471	....
17	4–15	3	3	1	23	0	0	0	3	59½	43	39	41	7 1/16	35.6	2575	....
16	4–15	3	3	1	29	0	0	0	0	58½	41	37½	39¼	7 1/16	35.4	2708	....
18	4–15	3	4	1	27	0	0	0	7	59½	43	38½	40¾	7 5/16	36	2720	....
20	4–15	2	59	2	15	0	0	0	15	......	......	......	......	......	36	4379	Hand brake.
19	4–15	3	1	2	32	0	0	0	0	......	......	......	......	......	34.8	4768	Hand brake.

TABLE 3.

COMPOSITE SHOES.

No. of Run.	Date of Run.	Time of Running Mile.		Time of Stop after Application.		Wheels Slid Feet.				Air Press. at Time of Application, lbs. per sq. inch.	Cylinder Press. immediately after Application, lbs. per sq. inch.	Cylinder Pressure at Stop, lbs. per sq. inch.	Average Pressure during Stop, lbs. per sq. inch.	Travel of Piston, inches.	Speed at End of Mile, miles per hour.	Distance Run after Application, feet.	REMARKS.
		Min.	Sec.	Min.	Sec.	1	2	3	4								
177	4–23	3	1	0	36⅗	0	½	0	4	79¾	57½	52	54¾	7 7/16	30.6	1011	....
179	4–23	2	59¾	0	39	0	0	0	5	84	61	54	57½	7½	34.4	1116	Oiled Boxes.
178	4–23	2	59	0	41	0	5	0	6	80	58	52½	55¼	7 7/16	34.8	1157	....
180	4–23	2	59¾	0	48	0	0	0	6	70½	51½	47	49¼	7	34	1381	....
181	4–23	2	55¼	0	50	0	0	0	8	70½	51	46	48½	7 1/16	35.4	1454	....
63	4–18	3	6	0	53	0	1	0	15	60¼	46	42	44	6	34.8	1547	Shoes and Wheels hot as Brakes were on when run to Martinsburg.
64	4–18	2	59	0	57	0	6	0	20	60	46	42	44	6	34.4	1594	....
190	4–23	3	0	1	3¾	0	0	0	2	58	42½	38	40¼	6½	33.6	1740	....
182	4–23	2	57¼	1	2½	0	0	0	3	60	44½	39½	42	6 11/16	34.5	1745	....
186	4–23	2	58	1	1⅗	0	0	0	2	60	44	39	41½	6 7/16	34.2	1763	....
183	4–23	2	59	1	2⅘	0	0	0	4	60	44½	39	41¾	6½	35	1765	....
185	4–23	3	¾	1	0	0	¼	0	4	60	44	39½	41¾	6½	33.6	1765	....
188	4–23	3	½	1	4	0	0	0	3	60½	44	39½	41¾	6 9/16	34.4	1820	....
189	4–23	2	58¾	1	4	0	0	0	2	60	44½	39½	42	6½	34.5	1830	....
187	4–23	2	58½	1	1⅘	0	0	0	3	60	44½	39½	42	6⅝	34.5	1831	....
70	4–18	3	12	1	5	⅔	5	0	12	61½	46	41	43½	6	34.8	1851	....
65	4–18	2	56	1	5	0	0	0	10	60¼	46	41	43½	5 15/16	36	1865	....
192	4–23	3	¾	1	5⅘	0	0	0	2	58	42¼	37½	39⅞	6 13/32	34.2	1887	....
184	4–23	2	59¾	1	5⅘	0	0	0	6	60	43½	39	41¼	6⅜	35	1927	....
193	4–23	3	1	1	7⅖	0	0	0	1	58	42½	38	40¼	6 9/32	34.4	1935	....

TABLE 4.

STEEL SHOES "D."

No. of Run.	Date of Run.	Time of Running Mile.		Time of Stop after Application.		Wheels Slid Feet.				Air Press. at Time of Application, lbs. per sq. inch.	Cylinder Press. immediately after Application, lbs. per sq. inch.	Cylinder Pressure at Stop, lbs. per sq. inch.	Average Pressure during Stop, lbs. per sq. inch.	Travel of Piston, inches.	Speed at End of Mile, miles per hour.	Distance Run after Application, feet.	REMARKS.
		Min.	Sec.	Min.	Sec.	1	2	3	4								
160	4–22	3	5	0	53⅗	0	0	0	2	61½	45	42½	43¾	8 7/16	30	1460	Brakes partly on.
154	4–22	2	56¼	0	56	0	1	½	8	82	58	51	54½	9¼	34.2	1612	....
31	4–16	2	58	0	58	0	0	0	150	79	57	53	55	8 7/16	35.6	1711	....
153	4–22	2	52¼	1	0⅘	0	3	0	4	81½	58	51	54½	9 8/32	35.6	1865	....
32	4–16	3	7	1	5	0	5	0	10	70½	51¼	48	49⅝	7⅞	35.2	1875	....
33	4–16	3	13	1	6	0	6	0	30	70	51	45½	48¼	7 13/16	35.4	1987	....
152	4–22	2	52½	1	4⅖	0	2	0	3	78	57	51	54	9⅛	36.2	2042	....
157	4–22	2	59	1	12⅖	0	0	¼	6	60	45½	42	43¾	8 5/16	34	2162	....
151	4–22	2	50¼	1	10	0	2	0	4	76	54½	47	50¾	8 15/16	37	2276	....
30	4–16	3	10	1	12	0	5	0	0	59	43¼	40½	41⅞	7 3/16	35.2	2290	....
29	4–16	3	5	1	13	0	0	0	0	58½	43	39½	41¼	7⅛	35.2	2307	....
147	4–22	2	56¾	1	13⅗	0	1½	¼	8	70	50¼	43¾	47	8⅝	36	2445	....
34	4–16	3	7	1	25	0	15	0	67	59	43	39	41	7½	36	2594	....
35	4–16	3	7	1	27	0	3	0	30	59½	44	38½	41¼	7½	36	2692	....
155	4–22	2	57¾	1	36	0	12	0	10	60	43	37½	40¼	8 7/16	34.8	2753	Hot rail.
159	4–22	2	52¼	1	33⅕	0	2	0	1¼	60	43	37	40	8 5/16	36.5	2812	....
149	4–22	2	52	1	32⅗	0	1¼	0	1¼	62	43	38½	40¾	8 5/16	36	2855	....
150	4–22	2	54¾	1	33⅗	0	0	0	2	62	44	39¼	41⅝	8 7/16	35.6	2866	....
158	4–22	2	50¾	1	39	0	0	0	4	60	43	37½	40¼	8⅜	37	3073	....
37	4–22	3	5	1	46	0	0	0	15	......	......	......	......	......	36	3352	Hand brakes.
156	4–22	2	48¼	1	45⅗	....	....	....	....	60	43	37	40	8 7/16	37.6	3370	Raining.
36	....	....	....	....	....	0	0	0	0	......	......	......	......	......	35.8	3846	Hand brakes.

TABLE 5.

STEEL SHOES "Z."

No. of Run.	Date of Run.	Time of Running Mile.		Time of Stop after Application.		Wheels Slid Feet.				Air Press. at Time of Application, lbs. per sq. inch.	Cylinder Press. immediately after Application, lbs. per sq. inch.	Cylinder Pressure at Stop, lbs. per sq. inch.	Average Pressure during Stop, lbs. per sq. inch.	Travel of Piston, inches.	Speed at End of Mile, miles per hour.	Distance Run after Application, feet.	REMARKS.
		Min.	Sec.	Min.	Sec.	1	2	3	4								
49	4–17	3	0	1	39	0	0	0	6	59	46	41½	43¾	7 5/16	35.2	3087	....
102	4–20	2	51¼	1	39	1/6	1½	0	2	71	50	43½	46¾	8 29/32	37.6	3262	....
101	4–20	2	50¾	1	44	0	4	1	4	70¾	50	43	46½	8 15/16	37.6	3425	....
51	4–17	2	58	1	56	0	0	0	0	59	43½	38	40¾	7 1/32	37.6	3829	....
50	4–17	2	45	2	0	0	1	0	5	59	43½	38½	41	7	37.6	3904	....
95	4–20	2	49	1	36	0	0	0	0	60¼	43	38	40½	8⅜	38.8	3977	....
100	4–20	2	50	2	12⅕	0	0	0	2	62	43½	38½	41	8 3/16	38.4	4503	....
97	4–20	2	50	2	13	0	0	0	3	62¼	43½	38¼	40⅞	8 7/32	38.6	4552	....
48	4–17	3	4	2	6	0	0	0	0	59	43	37	40	7	38.4	4598	....
99	....	2	50¾	2	22⅕	0	0	0	¼	62	43½	38	40¾	8 7/16	38	4766	....
96	....	2	48¼	2	27½	0	0	0	3	60½	43	37	40	8 11/32	38.8	5036	....

In calculating this retardation, the weight of the train and the weight of the wheels, together with the speed, have been taken into consideration and the total energy of motion calculated by adding the rotative energy of the wheels to the energy of the train as a whole, and after allowing for the effect of the grade and the effect of the ordinary resistance of the train without the brakes applied, the actual figures of retardation of the brake shoe against the wheels as an average during the whole distance of the stop has been calculated and presented in this table " A."

TABLE "A." **BRAKE RESISTANCE IN STOPPING TRAIN.**

No. of Run.	Cast-Iron Shoes. Pounds of Resistance.	No. of Run.	Composite Shoes. Pounds of Resistance.	No. of Run.	Steel Shoes "Z." Pounds of Resistance.	No. of Run.	Steel Shoes "M." Pounds of Resistance.	No. of Run.	Steel Shoes "D." Pounds of Resistance.
7	2123.60	71	2212.80	101	1688.80	19	*1625.80	36	*1794.10
10	*2162.70	177	2230.80	99	1698.00	20	*1715.00	152	1814.40
6	2202.00	69	2232.40	102	1717.20	21	1861.20	153	1856.80
132	2217.64	73	2236.00	96	1721.20	22	1873.60	151	1863.20
121	2308.40	68	2272.80	100	1738 40	18	2059.60	147	1882.80
120	2320.56	70	2276.80	97	1743.60	15	2059.60	37	*1907.50
122	2334.80	75	2307.60	48	1767.60	14	2076.00	154	1928.40
131	2352.48	66	2309.20	49	1772 80	17	2079.60	31	1934.40
130	2361.60	74	2310.00	50	1810.40	16	2108.80	150	1946.80
124	2403.20	185	2322.40	51	1836.40			156	1977.60
123	2412.80	179	2322.40	95	1867.20			32	2006.80
128	2454.40	180	•2326.40					155	2008.00
127	2462.40	187	2349.60					33	2011.20
8	2470.80	189	2350.40					149	2012 80
125	2479.60	65	2356.00					158	2020.00
126	2489.60	184	2362.80					157	2029.60
9	2577.60	188	2364.00					35	2045.20
		193	2370.40					159	2092.80
		191	2372.80					34	2095.20
		178	2396.00					30	2135.60
		186	2405.20					29	2159.60
		181	2405.60					160	2190.00
		192	2410.40						
		182	2414.40						
		64	2421.20						
		190	2449.20						
		183	2453.20						
		63	2500 00						

* Hand Brake.

Table " B " presents selected runs for the purpose of making comparisons between runs in which the pressure in the brake cylinder varies between close limits of 39⅝ minimum and 42 lbs. per square inch maximum. In this table " B " the figures have all been reduced on theoretical basis to 40 lbs. pressure to the square inch, thus giving a number of cases which can be very accurately compared with one another. At the bottom of the table the averages are given with each kind of shoe, and the percentages for comparisons.

TABLE "B." **BRAKE RESISTANCES.**

No. of Run.	Cast-Iron Shoes. Pounds of Resistance.	No. of Run.	Composite Shoes. Pounds of Resistance.	No. of Run.	Steel Shoes "Z." Pounds of Resistance.	No. of Run.	Steel Shoes "M." Pounds of Resistance.	No. of Run.	Steel Shoes "D." Pounds of Resistance.
121	2308.40	71	2212.80	99	1698.00	18	2059.60	150	1946.80
122	2334.80	73	2236.00	96	1721.20	15	2059.60	156	1977.60
124	2403.20	75	2307.60	100	1738.40	17	2079.60	155	2008.00
123	2412.80	74	2310.00	97	1743.60	16	2108.80	149	2012.80
128	2454.40	185	2322.40	48	1767.60	....	....	158	2020.00
127	2462.40	187	2349.60	50	1810.40	....	....	35	2045.20
8	2470.80	189	2350.40	51	1836.40	....	....	159	2092.80
125	2479.60	184	2362.80	95	1867.20	....	....	34	2095.20
126	2489.60	188	2364.00	....	....	....	....	30	2135.60
9	2577.60	193	2370.40	....	....	....	....	29	2159.60
....	....	191	2372.80	....	....	....	....	....	....
....	....	186	2405.20	....	....	....	....	....	....
....	....	192	2410.40	....	....	....	....	....	....
....	....	182	2414.40	....	....	....	....	....	....
....	....	190	2449.20	....	....	....	....	....	....
....	....	183	2453.20	....	....	....	....	....	....
	Average, 2439.36		Average, 2355.70		Average, 1772.85		Average, 2076.90		Average, 2049.36
	Per Cent, 100		Per Cent, 96.58		Per Cent, 72.68		Per Cent, 85.15		Per Cent, 84.02

Table "C" presents a comparison of the actual distances for four tests with each kind of shoe in which the air pressure and the speeds were almost exactly alike. It also includes a percentage comparison of the average of the four runs with each kind of shoe.

TABLE "C."

COMPARISON OF FOUR RUNS UNDER THE SAME CONDITIONS.

DISTANCE RUN AFTER BRAKING.

No. of Run.	Cast-Iron Shoe. Feet Run.	No. of Run.	Composite Shoe. Feet Run.	No. of Run	Steel Shoe "Z." Feet Run.	No. of Run.	Steel Shoe "M." Feet Run.	No. of Run.	Steel Shoe "D." Feet Run.
8	1806	192	1887	49	3087	15	2471	157	2162
7	1893	184	1927	50	3904	17	2575	150	2866
9	1805	68	1941	51	3829	16	2708	29	2307
6	1834	65	1865	101	3425	18	2720	34	2594
	Average, 1834		Average, 1905		Average, 3561		Average, 2618		Average, 2482
	Per Cent Av. 100.00		Per Cent Av. 103.87		Per Cent Av. 194.16		Per Ct. Av. 142.69		Per Ct. Av. 135.33

Two tests were made to compare the durability of the cast-iron, composite and the three different grades of steel shoes in continued service, and incidentally the wear of the wheels was also noted.

The car on which the tests were made required sixteen shoes, which were made up as follows in the first test:

4 Cast-iron shoes.
4 Composite shoes.
4 Steel shoes "Z."
2 " " "D."
2 " " "M."

Grouping the two grades of steel "M" and "D" together as from one foundry, the total wear of the four shoes of each manufacture was as follows, while the car ran:

KIND OF SHOES.	WEAR.	
	Actual Pounds.	Percentage Comparison.
4 Cast-iron	23.530	100
4 Composite	11.394	48.4
4 "Z" Steel	2.337	9.9
2 "D" " 2 "M" "	1.680	7.1

A second test was made to determine the durability of the shoes, and, if possible, to get a better record as to the relative wear of the wheels, and the following table gives the results, including also a statement of the relative distances run after the application of the brakes, taken from the former tests reported.

Three sets of cast-iron shoes were practically worn out during these tests, and one set of composite shoes, while the steel shoes were not much worn. So far as the wear of the wheels is concerned, the results were somewhat contradictory, and inasmuch as a large portion of the wear of the wheels is from the rail it would be unsafe to ascribe all the difference to the shoes.

COMPARATIVE WEAR OF CAST-IRON, COMPOSITE AND STEEL BRAKE SHOES.

KIND OF SHOE.	WEAR OF				Relative Distance Run after Application of Brakes. Taken from other tests.	REMARKS.
	SHOES.		WHEELS.			
	Pounds.	Per Cent.	Reduction in Circumference, in Inches.	Per Cent.		
Cast-Iron	94.690	100.00	2.812	100.00	100.00	12 Shoes worn out.
Composite	37.635	39.75	2.343	83.32	103.87	4 Shoes worn out.
Steel "D"	5.708	12.06	1.156	82.21	135.33	2 Shoes slightly worn.
Steel "M and D"	10.220	10.79	2.437	86.66	139.04	4 Shoes slightly worn.
Steel "M"	4.532	9.57	1.281	91.11	142.69	2 Shoes slightly worn.
Steel "Z"	8.194	8.65	2.969	105.58	194.16	4 Shoes slightly worn.

Mr. Sanderson: I move that the report be received.

The motion was carried.

Mr. Mackenzie: Is it understood that the report will be printed in the Proceedings without further action?

The President: The Secretary says the report will not be printed unless so ordered.

Mr. Mackenzie: Then I move that the report as made by the Secretary be printed in the Proceedings of the Association.

The motion was seconded.

Mr. Rhodes: Before the motion is put I would call attention to a point in the report on page 9 in reference to composite shoes. The report says that the composite shoe consisted of cast iron with a small percentage of wrought iron in the rubbing surfaces extending through the shoes, the percentage of wrought iron being somewhat less than seven per cent of the whole surface. I want to call the attention of the Association to this point, so that we will not fall into any error. On our line we use a composite shoe, and have for a number of years, on account of the saving which we find by using that shoe. But it is not a shoe of this character. It is not a composite shoe with only seven per cent of wrought iron in it. It has in the neighborhood of forty per cent of wrought iron. I can readily see that a test made of a shoe with only seven per cent of wrought iron might give entirely different results.

Mr. Marden: I think this matter of metal for brake shoes is one, perhaps, of more importance than we are giving it credit for. It is one in which there is a daily outlay by the various roads, and the outlay may be made more or less as we give it study and as we experiment, perhaps, with metal for use in brake shoes. And it seems to me that it is a matter which ought not to be passed over so lightly. I think our Secretary is deserving of credit for the report which he has presented to us, as it contains quite a little that may give us a chance to study during the coming year. We have made, on our road, quite a number of experiments as to different metals for brake shoes, and we find that on steel-tired wheels we cannot run with as good results with the same kind of metal as we can on chilled wheels. In fact we are using today nothing but chilled brake shoes on steel-tired wheels. Other roads, I understand, are using a composite, or some other kind of shoe, perhaps with better results. On cast-iron wheels we are using a composite shoe and we are also using what is known as a

Congdon shoe. I should be very glad to have an extended discussion of this matter of metal for brake shoes and to take further part in it as the discussion progresses.

Mr. Lewis: I agree with Mr. Marden in what he says of the importance of this subject. It has been shown by the report of the Secretary that it involves the expenditure of a large amount of money in the annual consumption of brake shoes. The question of consumption or wear of the metal is one that is worthy of consideration. I do not claim to know very much about the co-efficient of friction or the resistance of the different metals in brake shoes. But we do know that we get good results from the use of all the different varieties of brake shoes mentioned, and there is not any of them that has developed any serious weakness. When you refer to the test on page 17 of this report, you will notice that the consumption of cast-iron shoes is stated to be 23.530 pounds, while the consumption of steel shoes is from 1.680 to 2.337 pounds. In other words you have used nearly twenty times as much cast iron in the same service as you have of steel. It is assumed, of course, while the mileage is not given, that the mileage given by the different kinds of shoes mentioned in the report was the same. Now, the difference in the cost between the steel, composite or cast-iron, is not above a ratio of 2 or 3, while you notice that in the wear the ratio is as 1 to 20. Now, I have never considered that a steel shoe was objectionable for a driving brake shoe, and I never have known them to injure the tires, and if they wear twenty times as long as a composite or cast-iron shoe, I think it would be advantageous for us to use them.

Mr. Waitt: In connection with what Mr. Lewis has said, there is another feature that comes in for consideration — the matter of the length of time that the shoes of various manufacturers will wear is offset considerably by the amount of shoe resistance or holding power of the various metals. I notice on page 16 and then again on page 15 the two tables there show that there is a material difference in the resistance between cast iron and steel, the steel in the tests running an average of only 2,049 as against 2,439, or only 84 per cent of the holding power of cast iron. It seems to me that this should be taken into consideration and that we should not base a decision as to what is the best metal for brake shoes entirely upon the wear. And then, of course, will come in the consideration as to the effect on the wheels. It has been said by some—I am not prepared to say how true it is—

that there is nothing gained by changing metals for brake shoes, that just so surely as you get a brake shoe that wears longer you are taking the life out of the tire — out of the steel tire, if it is a steel-tired wheel, or out of the tread of the wheel, in the same proportion, or nearly so, as what you gain in the wear of the shoe. With regard to that, I cannot verify the statement one way or the other, but it is a feature that comes in for consideration. If any of the gentlemen here can refer me to any data as to the comparative effect on the treads of wheels, either steel or chilled, of brake shoes made of different metals, showing whether there is a corresponding increase of wear on the wheel if a harder metal is used as a shoe, I should be very glad to be put in possession of such information.

MR. SANDERSON: We made some trials, I think it was four years ago, with some heavy shifting engines, putting cast-iron shoes on one side of the engine and steel shoes on the other. We found that the steel shoes outwore six and one-half sets of cast-iron shoes. We have been using cast-steel shoes since then on the driving wheels on all our larger engines on heavy mountain service where much sand is used, and we find that the steel shoe cut down the tires about as fast as they wear on the rails. I was looking up the record the other day and found there was an engine that had been on the road two years on heavy mountain service, and did not require returning yet. That is the Ross cast-steel shoe. I would like to ask in regard to this report whether there were any release springs on these brake beams. The power seems to be calculated on the pressure in the cylinder. Now, we made some little rough tests the other day with a hand dynamometer, and found it took over eight hundred pounds, with some forms of release springs, to pull the shoe up to the wheel. We could not make any calculations as to the co-efficients of friction and resistance.

MR. CLOUD: As the report states, the information that is contained here about these tests is furnished by the Pennsylvania Railroad Company. The report did not give any information on that subject. The standard, however, uses a release spring, and I presume it was used in this car. But how much it took to overcome it, I have no idea.

MR. LEWIS: In regard to the effect of different metals on the steel tire or on the wheel, we know that the Ross-Meehan shoe is designed to wear the part of the wheel that is not in contact with the rail nearly as fast as the wheel wears where it is in contact with the rail. The fact is that we never have seen a shoe constructed in that way that has worn the wheel as fast as the rail will wear it.

Mr. Hayward: I do not think it is so much a question of economy — though that is an important feature — as it is of efficiency. What we want is a good, efficient brake that will stop our trains in the shortest space. In these tables giving a comparison of four runs under the same conditions, I see the cast iron is 1,834 against 2,482 for steel, which is a very great difference, and I think the aim of the Association should be to get the most efficient brake shoe, regardless of cost, as long as it was not too excessive.

Mr. Sanderson: There is one other point I would like to raise; that is the work that is done in stopping a train by the application of the shoe to the wheel has to be absorbed in some way — disposed of. It is either done by grinding off metal or by producing heat. Is it not better to grind off a little more metal and keep the wheels cooler rather than run the risk of cracked wheels or loose tires?

Mr. Cloud: Does Mr. Sanderson mean to indicate that the more metal that is ground off by different grades of shoes the less would be the heat generated?

Mr. Sanderson: I thought a soft cast-iron shoe would let its particles be torn off and would generate less heat in doing it. At the same time the energy would be absorbed in tearing the metal apart rather than in producing high heat.

Mr. Cloud: I should like to say, inasmuch as I prepared this report, that I understood the President to desire me to get together some data which might convince the members of the importance of a thorough investigation of this subject. Now, these tests which are reproduced here are from the Pennsylvania Railroad and are not offered at all as conclusive or as of sufficient importance to warrant any deductions whatever, but simply as so much information, which is a mere handful compared with what we ought to have. I have referred in the report to the fact that in dealing with the amount of metal used per year I dealt only with one side of the question and entirely left out of consideration the other and very much more important side of the question, which Mr. Hayward has referred to, namely, the efficiency of the brake. But I could only present to you what I could get in a short time. I want to call your attention to the fact that you have had a committee for three or four years to investigate this subject. It is a subject which needs to be elucidated by tests, which cannot be made without some expense, and it seems as though the expense would be more than any one or two roads would care to incur. The Association now has a surplus of between $5,000 and $6,000, and unless the matter of brake shoes can be gone into in good shape and be properly elucidated without the expenditure of some of the Association's money, I do not know at the present time of any better way of expending a part of that money than by devoting it to a series of tests on this subject, which tests would be under the direction of some committee to be appointed by this Association.

THE PRESIDENT: I would like to say that in looking over the matter we found that it was an impossibility to get any one to make a test of brake shoes without some expenditure of money. I looked into it on our own road and estimated that it would cost in the neighborhood of from $3,000 to $5,000 to make the necessary tests, and that is the reason why we could not get the committee to make us such a report as they would like to make, and therefore the Secretary was asked to prepare the report which he has submitted.

MR. ADAMS: I would like to inquire if it would not be a proper thing for this Association to do to appropriate a certain sum of money for a special test of brake shoes and appoint a committee composed of men who are qualified to make these tests practically and properly. It seems to me and to others here in talking over the matter that as our Treasurer's report shows that we have some $5,000 in hand, that there was no reason why we might not expend some of it for such a purpose. It seems to me that that would be the practical way to get at it. No one road, of course, wants to go to this expense, and it is improper that any one road should do it. A matter of this kind that is going to be of benefit to all the railroads in this country should be borne by the railroads of the country. If we have not money enough to do it, it seems to me that the roads to be benefited by the experiments should be willing and would be willing to pay, if it was necessary to raise more money to do it. I feel myself as though our roads would justify us in making such an appropriation. I would like to know what the views of the gentlemen are. To bring it before the convention I would move that there be a committee appointed by the President, on mature deliberation, to make these tests at the expense of the Master Car-Builders' Association.

MR. MACKENZIE: I second the motion.

Mr. Adams: Leaving the amount to be expended to the Executive Committee. I would not ask the active members to pay a proportion of it. I would have it come on the roads. Let the assessment be made on the car basis alone.

Mr. Mackenzie: I withdraw my second to the motion, Mr. President.

The President: I do not see how you can make that separation, as the money is all in the treasury in bulk and it would be impossible to tell which was active and which representative.

Mr. Adams: You know just how much money you receive from active membership. You know the active members are assessed $5 apiece. The roads are assessed so much. I do not see any difficulty in figuring that out. I am not much of a mathematician, but I think I could do that sum.

Mr. Cloud: That can easily be done, but what next?

Mr. Adams: I would make the appropriation from that amount of money, and if there was not enough of it I would assess the roads still more; or let a special assessment be made on the railroads for this purpose, and keep the money in the treasury as it is.

Mr. Hennessey: It seems to me that the only practical way is to take the money out of the treasury as it stands, without any division, and as Mr. Adams is afraid that the committee will spend more money than they ought, we can put a limit on it.

Mr. Adams: I am not afraid a committee appointed by our President would be extravagant. I am willing to leave it to the judgment of the Executive Committee, and the committee that may be appointed, to use what money may be necessary to accomplish the end.

Mr. Lewis: I do not see any reason why an experiment should not be conducted in this line as it has been in others. We know that some of the roads have magnanimously stood the burden of an expensive brake test and an expensive compound locomotive test and coupler test, and it seems to me that some roads could stand, without very much of a burden, a test of this kind. Now, the committee can select any one road where they could conduct a service test of brake shoes and they could put those shoes into operation under exactly the same conditions. It would represent simply the outlay that a company would have to make in supplying their cars with brake shoes, and all that would remain would be for the committee to conduct the tests and tabulate the results. I do not think it would be very much of an expense to a company to conduct that test.

Mr. Harrison: I was going to ask the question if Mr. Adams was not originally one of the members of the committee on that brake shoe business; and if so, why the committee found that experiment too expensive or too great to make a report on it? We have been conducting experiments on the Baltimore & Ohio Road for some time to try to find out the most economical brake shoe for our service. We have had experience with the wooden brake shoe and the wrought-iron shoe and the cast-iron shoe, and when we try to take the wear of the wheel, and the wear of the rail, the conditions are so entirely different that it is almost impossible to get to any result at all. We were changing our cars, running them first one place and then another, until the only thing that we could do was to take them on to some local train. If we undertake to make an appropriation from the funds of this Association for an experiment of this kind, I take it for granted that we would exhaust the treasury very quickly before we could get to any definite results.

Mr. Adams: I would like to ask Mr. Harrison if he came to any conclusion as to which is the best brake shoe?

Mr. Harrison: No, sir, we have not yet. We are making brake shoes in our foundry of different grades, one of fifty per cent scrap and fifty per cent new metal, and of different kinds of metal, and we are trying them all.

Mr. Adams: You have not settled on any specific thing?

Mr. Harrison: No, sir; not yet. We have not been satisfied that we have got to that point. We have all shoes tested from different foundries to see what the value of the shoes is and are using them on our local trains. We have not arrived at any conclusion yet as to what the best metal would be. Soft metal has given very good results, and some experiments reported to this convention by Mr. Rhodes were very satisfactory. But he wanted to go so far as to get the wear of the wheels and the wear on the rail — experiments that are exhaustive. You cannot get down to that. What man can tell just what the wear on the rail is and the wear of the tread of the wheel and all that?

Mr. Adams: It is certainly very important to know whether the brake shoe wears the wheel out a good deal faster than you can afford to have it wear with a certain class of brake shoe. That would be as important as to know what iron was the best for the shoe — quite as important, it would seem to me.

Mr. Harrison: I would like to say one word in reply to Mr. Adams. The only way I know is to take the diameter of the wheel when put in new, and find out how much the rail has worn that off, and the dimensions of the brake shoe, and then in all probability you can arrive at some conclusion when you have got all those facts.

Mr. Adams: I would leave out the wear of the rails, because I do not think it is so important. But it is of some importance. Steel wheels are pretty expensive things. If you are going to wear your wheel twice as fast in using a certain kind of shoe as in using another, you will lose more money in your wheel than you save in your brake shoe, so that that has a very important relation to the matter. I am not particularly anxious about this thing. I merely throw this out as a suggestion. I know one thing. I know the Boston & Albany Railroad will not make a regular test for the benefit of this Association and the roads generally, and I do not blame any road for declining to make such a test. I would not do it if I was connected with any road. I would not advise it. I do not think it is fair for one road to bear the expense of such a test. The C. B. & Q. very magnanimously made that extensive brake test, and it incurred expense for the benefit of the railroads of the country. This thing ought to be borne unitedly all over the country. All the roads are benefited by it.

The President: The only motion we have before the Association at this time is that the report be printed in the Proceedings. Mr. Adams' motion was seconded. All in favor of the motion will show their consent by saying aye — opposed, no.

The motion was carried.

Mr. Mackenzie: I move that a committee be appointed by the chair to report at our next annual convention upon the advisability of making an extensive brake-shoe test. I want to say now that in order to do this it will be necessary for that committee to have different kinds of wheels under the cars and different kinds of brake beams, and I think that that should be embodied in the motion. We can make a test of a brake shoe and also of a brake beam at the same time, and I believe that there are lots of lines running through the country who would be glad to furnish cars with different kinds of wheels in order to make these tests. I am in favor of expending the money that is in the treasury of the Association, and I do not believe that it is necessary to make any further levy on the railroads. The railroads will want to know after a while what has been done with that money. The money belongs to them. We are here as their representatives. We are here to spend that money for their best interests.

The motion was seconded.

MR. MARSHALL: I would like to amend, that the committee report at the last session of this convention instead of next year. It seems to me the committee might consider it and put it in shape for some action at this convention.

THE PRESIDENT: Do you accept that, Mr. Mackenzie?

MR. MACKENZIE: No, sir, I do not believe the committee can do it.

A MEMBER: I second the amendment.

THE PRESIDENT: Then the question is on the amendment. The secretary will read the motion.

MR. CLOUD: The original motion was that a committee be appointed by the Chair to report to the next annual convention on the advisability of making an extended brake-shoe test. The amendment is that the report of the committee be made at the last session of this convention instead of next year.

THE PRESIDENT: We will vote on the amendment and not on the original motion.

A vote was taken upon the amendment, and as the President was in doubt he called for a rising vote, when 32 voted in favor of the amendment and 25 against it.

THE PRESIDENT: The amendment is carried.

MR. HAYWARD: Is it in order to make an amendment to that?

THE PRESIDENT: We will have to put the original question as amended.

MR. CLOUD: I will read the question as amended. It is that a committee be appointed by the Chair to report at the last session of this convention on the advisability of making an extended brake-shoe test.

MR. HAYWARD: The only amendment I wished to make was that the same committee should report not alone on the advisability, which

I think we are all satisfied of, but on a proposed method and an estimate of the amount that should be appropriated for that purpose.

MR. WAITT: I second that amendment.

THE PRESIDENT: The Secretary will read the amendment to the amended motion.

MR. CLOUD: Mr. Hayward proposes that the motion be amended so as to have this committee report at the last session of this convention on the advisability of making extended brake-shoe tests and that they propose a method of making them and a limit to the amount to be appropriated for the purpose.

MR. LEWIS: It would seem to me that we are giving the committee too much latitude in that matter, or at least the instructions are indefinite. I believe that the committee should be instructed to report its action to the Executive Committee and that the resolution should be submitted to a letter ballot. Of course, we cannot investigate the subject and take any intelligent action at this session. But at the same time I think that the Association should have a voice in the proceedings and actions of this committee and they should be requested to report as early as possible to the Executive Committee who should prepare and issue a letter ballot on the subject.

MR. MACKENZIE: I think that the original motion embodied all that is necessary. We all know that we cannot get up an intelligent report to submit to the Executive Committee or this body in two days. Your reports are extended and there are a great many of them, and I do not see how you are going to get this before the Association at all. I think that the members of the committee appointed by the Chair should have time to think this over carefully, and I do not believe they can do it in less than a year.

MR. WAITT: I will say that my reason for seconding the amendment was because I believed, when the amended motion was put before the house, it was clearly seen, as Mr. Mackenzie stated, that it was absolutely impossible for a committee to make such a report, and thinking that that amendment to the motion would possibly put it so clearly before the members that they would see that and vote it down, I seconded it. But there is one thing, I think, that we should all consider. A committee to prepare a report on this subject must consider in the first place the means for carrying on the experiment. They must know something about what the cost will be. In order to do that they must communicate with various railroads to see what those roads will be willing to do in the matter, with and without cost to the Association. For these reasons it seems to me impossible to make a proper report during this convention—a report giving an estimate of the expense and the details of a test proposed to the Association. I seconded the amendment, because I think it is impossible to prepare such a report to this convention, and I hope the amendment will be killed.

MR. DAY: I understand that this report is to be made at the last session of this convention as to the advisability of taking up this matter — as to whether it would be practicable — as to what we could do — as to the approximate amount of money that would be required. That would be merely advising us. Now, if the convention saw fit to appoint such a committee, why then it could go ahead and do so. If not, it would be killed at that time or done away with. This committee could not report, evidently, as to what could be done, but it could report as to whether it would be advisable to do anything.

THE PRESIDENT: Gentlemen, do you understand the amendment? The Secretary will read it.

MR. CLOUD: The motion as amended reads as follows: "That a committee be appointed by the Chair to report at the last session of this convention on the advisability of making an extended brake-shoe test." There is now a second amendment proposed which consists in adding to the duties of this committee the duty of reporting a proposed method of tests and suggesting a limit to the amount to be appropriated for the purpose.

THE PRESIDENT: You will vote now on the last amendment.

MR. QUAYLE: It seems to me that this Association did not authorize any expenditure, and now we have embodied in this amendment a limit of the expenditure. It seems to me we ought to take up the question whether we should allow the expenditure before we embody the limit in the motion. Again, it seems to me that you are going to appoint a committee and that committee is to dictate to another committee how that committee shall conduct the test, and the committee appointed subsequently may not concur in the views of this advisory committee.

THE PRESIDENT: We will now vote on the second amendment to the original motion.

The amendment was lost.

THE PRESIDENT: The Secretary will read the motion as it stands.

MR. CLOUD: The question is whether a committee shall be appointed by the Chair now to report at the last session of this convention on the advisability of making an extended brake-shoe test.

The motion was carried.

The convention then adjourned until the following day.

SECOND SESSION.

The convention was called to order on Wednesday, June 14, at 9:15 A.M.

THE PRESIDENT: We have one or two papers here that will require very little time, which we will take up before proceeding to the consideration of the Rules of Interchange. The Secretary will read the Auditing Committee's report.

The Secretary read the following report of the Auditing Committee:

To the Master Car-Builders' Association:

Your committee appointed to audit the accounts of the Secretary and Treasurer of this Association have to advise that it has fulfilled its duties and finds the accounts correct.

WILLIAM MCWOOD,
A. E. MITCHELL,
L. PACKARD,
Committee.

On motion, the report was received and ordered to be spread upon the minutes.

THE PRESIDENT: We have a letter here from the Supreme Lodge of the Car Inspectors' Protective Association, which the Secretary will read.

MR. CLOUD: A short time ago I received a communication from Mr. E. D. Hill, representing the Car Inspectors' Protective Association, saying that he had been appointed a delegate to this convention; to which I replied that he should present his credentials to me or to the Executive Committee. This has been done this morning with the following letter:

Mr. Cloud: CHICAGO, May 24, 1893.

This is to certify that Mr. E. D. Hill, of Providence, R. I., being a supreme officer of the Car Inspectors' Protective Association of North America, and elected at our last convention in Pittsburgh, Pa., wishing to seek admission in your annual convention for the purpose of explaining the views and objects of our organization before your honorable body. Hoping you will give this your attention, and also admit our worthy delegate in behalf of our organization,

JOHN F. PETERS,
Supreme Secretary.

THE PRESIDENT: The gentleman is here, and he called on me this morning and I explained to him that he could only speak by unanimous consent, as he is not entitled to membership and does not represent any cars.

MR. RHODES: It seems to me that when we get propositions from outside persons to address our convention that we ought to consider very carefully what that means. Now, there might be some whom we would like to hear from very well. But when once you open the door it is going to be very difficult to know where to draw the line. The gentleman mentioned is not the only one who wishes to address the convention. There are others present at Chautauqua now who would like also to address the convention, and I do not believe we are here for that purpose. Personally I am opposed to occupying our time in that way, or to introducing that feature. I would therefore move that the request be not granted.

MR. MARSHALL: I second the motion.

THE PRESIDENT: It is moved and seconded that the request of the Supreme Lodge of Car Inspectors to address the meeting for the purpose of explaining the views and objects of that organization be not granted. There would be no objection to the gentleman sitting here and listening to our discussion if this motion prevails.

The motion was carried.

THE PRESIDENT: We would be glad to have the delegate stay and hear the discussion. We will now take up the Rules of Interchange. This is the special order of business for today. I would request Mr. Lentz to take the chair.

The remainder of the session was devoted to revising the Rules of Interchange. On motion of Mr. Waitt the decisions of the Arbitration Committee for the last year were approved.

After disposing of the Rules of Interchange the convention adjourned until the following day.

THIRD SESSION.

The convention was called to order on Thursday, June 15, at 9:10 A.M.

THE PRESIDENT: The Secretary has some announcements to make.

MR. CLOUD: I have a telegram from H. S. Clement, Congress Hall, Saratoga, addressed to the President of the Master Car-Builders' Association, as follows:

> Hope you will decide on Saratoga for your convention next year and Congress Hall for headquarters. Hotel will be at the disposal of you and your associate members as heretofore.

MR. BLACKALL: I move that the telegram be referred to the Joint Committee of the two Associations.

The motion was carried.

MR. CLOUD: The following communication was received last evening:

> CHAUTAUQUA, N. Y., June 13, 1893.
>
> We are building a very large amphitheater and one of the most complete sewer disposal work in America. We would be glad at your convenience to have you examine the same. If you will appoint a time, Mr. E. G. Hall, architect, and Mr. Thomas McKenzie, engineer-in-chief, will be pleased to show you the same.
>
> W. A. DUNCAN,
> *Secretary Chautauqua System of Education.*

THE PRESIDENT: If you do not want to take any action on the letter just read, gentlemen, we will take up the reports of the Committee on Standards. That is the first business of the morning.

MR. ANGUS SINCLAIR: If it is in order, I would like to make a statement about a matter connected with the Association indirectly. It is about an excursion. The information has come to me in connection with the Master Mechanics' Association. Most of you are aware that there is to be an excursion on Saturday to Oil City, tendered by the Erie Railroad Company. I have been notified by the Western New York & Pennsylvania Railroad Company that they would like to pull the train from Oil City to Maysville at the end of the lake, and that the party be taken up the lake by boat. Something will need to be done about that this morning, because they want to have the answer, and if you are willing to have that done they will be glad to do it, and if not, it is better to notify them.

Mr. Cloud: Will it be satisfactory to the New York, Lake Erie & Western, whose invitation we have accepted?

Mr. Sinclair: I think so. I have been under that impression. The New York, Lake Erie & Western wished the other road to pull the train from Oil City to Corry, anyway.

Mr. Marshall: I think it would be well to wait until Mr. Mitchell or Mr. Higgins is here. They would probably be able to settle that matter.

The President: We will take up report No. 2, on Axles, Journal Boxes, Lids and Wedges. Mr. Soule, will you read the report?

Mr. Cloud: I have here a small pile of the reports of last year left over, on standards of the Association. It may not be necessary to read that report, but should any member want to refer to a copy of it in addition to the specific report on a portion of it which Mr. Soule is about to read, there are a number of copies here.

Mr. Soule then read the following report:

REPORT OF THE COMMITTEE ON AXLES, JOURNAL BOXES, LIDS AND WEDGES.

To the President and Members of the Master Car-Builders' Association:

Your committee on Axles, Journal Boxes, Lids and Wedges has been instructed "to consider the suggestions of the Committee on Standards and to recommend in detail, with drawings, how these Standards should be modified and published."

The recommendations of the Committee on Standards as reported at the Convention of 1892, as regards Axles, Journal Boxes, Lids and Wedges, are as follows:

"Axle.—The committee is of the opinion that it would be expedient to submit to a special committee, appointed for the purpose, the question of modifying the present light axle so as to make its journal 4 by 7 inches instead of 3¾ by 7 inches as now.

"Journal Box.—It is suggested that the drawings of the present Standard Journal Box, if reproduced full size, should be very carefully revised, as there are evidences that the present drawings are not complete in every respect.

"Journal Box Lids.—The drawings should be revised together with the drawings of the Journal Box.

"Journal Bearings and Wedges.—The designs for these parts also need to be carefully redimensioned."

Your present committee advises in reference to these several details as follows:

Axle.—The Committee on Standards called attention to the fact that a considerable number of roads had increased the diameter of the journal of the light axle from 3¾ inches to 4 inches, thus making the journal 4 by 7 inches instead of 3¾ by 7 inches, which latter dimensions are standard. Our committee does not feel justified, however, in advising the abandonment of the present standard and the adoption of a new standard: our principal reason being that it is evident that nearly all new freight equipment cars recently built have been mounted on the large axle, having journals 4¼ by 8 inches, and it will be a question of only a few years when the light axle with journal 3¾ by 7 inches will become out of date and practically obsolete. We believe that at that time it can, with advantage, be officially declared as obsolete, but doubt whether there would be any advantage in taking any action whatever in reference to the light axle at the present time.

JOURNAL BOXES, JOURNAL BOX LIDS, JOURNAL BEARINGS AND WEDGES.—It is conceded that the designs for these parts, as illustrated by the lithographed sheets which are issued annually by the Association in connection with its Report of Proceedings, are very defective; not being completely dimensioned, and the dimensions which are given on the different views not always checking accurately one with another. It is well known that different railroad companies and car builders make journal boxes which are supposed to be, and are called Master Car-Builders' Standard, but which, as a matter of fact, differ one from another in many minor details; we believe that this condition of things may fairly be attributed to the fact that the official drawings of the Association are imperfect. Therefore, we advise that these drawings should be republished in six different sheets; one set of three sheets to show the journal box and parts, for axle with journal 3¾ by 7 inches; the other set of three sheets to show the journal box and parts, for axle with journal 4¼ by 8 inches. Each set of three sheets to comprise, First: A full-sized drawing (in three views) of the journal box with all its contained parts (such as axle, journal bearing, wedge, lid, etc.) in their proper relative positions, as in service. Second: A full-sized drawing (in three views) of the journal box by itself, without any of its contained parts. (This drawing being intended for use in making journal box patterns.) Third: A full-sized drawing (in several views) showing separately the journal bearings, wedge, lid and lid hinge bolt.

The committee submits herewith a set of such blue-prints from drawings which have been prepared for the purpose, but calls attention to the fact that the prints illustrate only journal boxes adapted for use in diamond trucks. If the Association thinks it necessary, similar drawings can readily be prepared showing a modification of these designs as required for a journal box for use in connection with a truck of the pedestal type. The committee also calls attention to the fact that in preparing these designs which are now submitted, it was necessary to show some definite form of journal box lid, although the standard of the Association simply provides that the lid shall be hinged at the top and shall be of certain general dimensions, but does not specify the particulars of material or construction. Furthermore, the published illustrations of the present standard journal boxes and lids do not include any details of the lid hinge bolts. Therefore, we have taken the liberty of introducing in the proposed revised designs, details of these bolts.

Your committee concurs in the recommendations of the Committee on Standards that all drawings issued under the auspices of the Association as illustrating its standards, shall be uniform in size and shall be made on strong transparent paper, so that blue-prints can be taken from them direct. Also, that lithographed sheets of reduced size should be bound into the Annual Proceedings, as now.

Respectfully submitted,
R. H. SOULE, Roanoke, Va.,
Supt. Motive Power Norfolk & Western R. R.
W. H. DAY, Florence, S. C.,
M. C.-B., W. C. & O. R. R.
W. H. LEWIS, La Crosse, Wis.,
Master Mechanic, C. B. & N. R. R.

ROANOKE, Va., May 10, 1893.

NOTE.—*See cuts at end of volume.*

MR. SOULE: The six blue prints before you show the two standard journal boxes and the details; the three prints in the upper row, as here arranged, are of the older standard journal box, and are numbered 1, 2 and 3. The first sheet shows the standard box with its contained parts; the second sheet shows the journal box only, and is intended for the use of pattern makers. This third sheet gives the details of the contained parts, including four views of the wedge, four views of the bearings, two views of the lid and three views showing the wedge and the bearing together, so as to show where the rocking is introduced, there being a difference in that respect between the light journal box and the heavy journal box. This lower row of three sheets, Nos. 4, 5 and 6, gives the same series of illustrations for the heavy journal box. The committee was not instructed to revise the standard, and we have not considered ourselves at liberty to do anything in that direction with the single exception that in the journal box at this point (indicating) we have introduced a slight recess which does not affect the pattern, and which can be accomplished by making a slight alteration in the core box, simply because in practice it is almost impossible to get a square corner between the top surface of the inside of the journal box and the back face of this stop for the wedge; and we have taken the liberty of introducing a little recess in the casting at that point so as to avoid that fillet. In addition to that we have taken the liberty of completing the journal box lid, and have introduced a detail of the lid and hinge-pin or bolt, thinking that the latter was a legitimate detail properly belonging to the others.

MR. CLOUD: I might have said before this report was read that it has been before the Executive Committee and is submitted by the Executive Committee to the Association with the statement that if you take any action upon it the drawing of the lid will be so modified or annotated, before it is published, as to justify its construction in malleable iron as well as steel, if anybody wants to do that, so as to avoid any possible complication in view of any claimed patent on the use of steel in the lid.

MR. SOULE: I might say in addition that the Committee on Standards last year recommended that the standards of the Association should be illustrated by a series of full-sized drawings. That report has not yet been discussed or acted on. But in preparing this special report for this year on the subject of journal boxes it is necessary to assume some size of drawing, and this is the size of sheet that was selected as being sufficient to show the largest details that we have in full size. There is hardly any one of the standards of the Association that requires more space for complete illustration than this journal box. Therefore, if the Association acts favorably on the suggestion of the Committee on Standards that there should be a standard sized sheet adopted, the Committee on Standards will then recommend that this shall be the size of the standard sheet.

MR. WAITT: I move that the report be received and opened for discussion.

The motion was carried.

THE PRESIDENT: The report is now before the convention. Mr. Soule, will you state explicitly just what recommendations the committee make in regard to standards so that we can get them before the meeting in proper shape?

MR. SOULE: The recommendation of this committee was, in the first instance, that the standard for light axles should not be changed. The second recommendation was that these drawings, as now submitted, should be accepted as representing the existing standards of the Association in the matter of journal boxes and contained parts. We do not recommend any change in those standards; we simply submit these drawings for adoption. The trouble previously to this, as pointed out by the committee of last year, was that there was a diversity in journal boxes which were called Master Car-Builders' standard, this diversity being supposed to be due to the fact that the drawings were rather involved, the idea being that too much had been attempted. They were small scale drawings and there was no drawing which gave a representation of the journal box by itself; all the drawings showed a journal box, with all the contained parts and on a very small scale, making it very difficult for any two pattern makers to translate them the same way. The result was a wide diversity in journal boxes which are called standard.

Mr. Marshall: It seems to me it would simplify this question a great deal to take up the report of the Committee on Standards and dispose of that and then take up the subsequent report afterward. In order to do that I move that this be laid aside until the report of the Committeee on Standards of last year be disposed of.

The President: It is perhaps not necessary to read the report of last year, as it has been printed and put in the hands of the members.

Mr. Marshall: Then we might take up the suggestions of the committee of last year and act on them.

The President: Mr. Soule has already made the statement in regard to the recommendations of the committee. The Secretary will read the recommendations of the report of last year so that we will have them before us.

Mr. Soule: Do you mean the recommendations that relate to this one matter, or all the recommendations?

The President: All the recommendations.

Mr. Soule: Referring to the report of the Committee on Standards of last year, this entire report was read at the Saratoga convention, but was not discussed. That portion of the report which is covered by the first fifteen pages, including the first paragraph of the sixteenth page, is preliminary. That is simply a recital of the facts as reported by the committee. The discussion of those facts and the recommendations of last year's committee begin with the second paragraph on page 16. I will read, beginning at the second paragraph of page 16 of the last report:

> In view of the facts which have been recited, the committee is ready to advise that the following standards should be rescinded and abolished: Diameter testing gauge, flange and journal gauge, wheel-bore testing gauge, journal length and diameter gauge, guard-rail guage, centering and journal shoulder gauge, journal distance gauge, boring wheels (the use of six dogs), attachments and dimensions of drawbars, train-pipe fitting for steam heat, etc.

Mr. Waitt: In view of the fact that action on the report of the committee was deferred last year so that several special committees should be appointed to report on matters brought up by the Committee on Standards, and as those committees will probably all make their reports at this convention, I would move that the recommendations made by the Committee on Standards, except so far as details may be modified by action taken on the report of special committees, be adopted by the Association and referred to letter ballot. That would cover these recommendations that they have made except as modified by these several committees.

Mr. Marshall: I second that motion.

The President: The Secretary will read the motion.

Mr. Cloud: The motion is, I believe, that the recommendations of the committee in this report of last year, except in so far as action may be modified by action on special committees' reports under this head, may be adopted and submitted to letter ballot.

The motion was carried.

Mr. Marshall: I move now that the recommendations of Mr. Soule's committee of this year on axles and journal boxes be taken up, or rather that the recommendations of that committee be submitted to letter ballot.

Mr. Waitt: I second that motion.

Mr. Leeds: Do I understand that that changes our standards?

The President: No, there is no change in the standards.

Mr. Leeds: Then is it necessary submit it to letter ballot?

The President: It is only that they have been reproduced and put in better shape.

Mr. Leeds: I do not think it necessary to put that to letter ballot, and the only thing that I understand is that they have recommended the standard size of sheet and the material that it is to be printed on, on which I hardly think it is worth while to take a letter ballot.

Mr. Cloud: The dimensioning has been rearranged, and the change in the drawings, although it results in no change in the detail construction, I think ought to be passed on by letter ballot. Certain parts come on one sheet and are shown more in detail than heretofore.

The motion was carried.

The President: Now we will take up the first committee—Drawbars and Brake Beams.

MR. SINCLAIR: Is there any time to bring up that question which I brought before you previously with reference to the offer of the Western New York & Pennsylvania to draw that train from Oil City to Maysville? Mr. Mitchell has been consulting about it and there has been an objection to it on account of the time it would take up, as the people could not get back to the hotel before 9 o'clock. If it is agreeable to the meeting, I think we better send word to the Western New York & Pennsylvania people that to pilot the train from Oil City to Corry would be sufficient. That would bring the train by a slightly different route from what it would take otherwise.

MR. CLOUD: I would say that the Secretary has received no suggestion from the Western New York & Pennsylvania that it take part in the excursion of the Erie Railroad which has already been accepted.

MR. SINCLAIR: I received a letter from the General Master Mechanic of the Western New York & Pennsylvania, making that offer to pull the train from Oil City to Maysville, and he desired me to bring it before the meetings. He did not specify what meetings, but of course he meant both. It would not go before the Master Mechanics because they do not meet by that time. Consequently this meeting has to deal with it, if any. It seems to be only ordinary courtesy that we should accept or decline it.

MR. MITCHELL: I would say that the New York, Lake Erie & Western Railroad proposed to take this train to Oil City by way of Meadville and Franklin. If we came back the same way it would make a long journey, and the Western New York & Pennsylvania has very kindly offered to pull that train from Oil City to Corry without any request by the Association as a body. That would shorten the distance home on that excursion.

MR. CLOUD: I think the Association ought to act on that and say that it would be entirely agreeable and with thanks to the Western New York & Pennsylvania. It is a matter between the Erie Railway and the Western New York & Pennsylvania, inasmuch as the Association has received no suggestion, officially, from the Western New York & Pennsylvania.

MR. LENTZ: I move that any arrangement made by the New York, Lake Erie & Western Railroad Company will be satisfactory to the Association.

The motion was carried.

The President: The report of the Committee on Height of Drawbars and on Standard Iron Brake Beam will be next considered.

Mr. Simons: Before that report is taken up I would beg to ask for some information. I note by the publication of the Proceedings in the *Railway Age* this morning that Rule No. 19 was made to read as follows:

> Cars originally equipped with link and pin coupler shall be accepted, provided drawbars fit properly, have sufficient strength and are in good condition, requiring cards only for any addition that have been made for rear attachments.

Should not that word "addition" have been "alteration?"

The President: That is out of order.

Mr. Simons: I only want to know whether that is in our Proceedings.

The President: It is in our Proceedings correctly. I do not know what is in the *Railway Age*.

Mr. Rankin: Mr. President, in the absence of the chairman of the committee and also of Mr. Bean, I would request that the Secretary of the Association read this report.

The Secretary read the following report:

REPORT OF THE COMMITTEE ON HEIGHT OF DRAWBARS AND STANDARD IRON BRAKE BEAM.

To the President and Members of the Master Car-Builders' Association:

The instructions to your committee to consider the suggestions of the Committee on Standards as to standard height of drawbars and as to standard form of brake beam, and to report with recommendations and drawings in detail. In their report on "Standards," made to the convention of 1892, they say, in regard to the height of drawbars:

> "The indications are that the standard height of 33 inches for freight equipment cars has not been adhered to, and there is a tendency to increase this height. It would, therefore, seem well to have the facts reviewed by a special committee, who should advise whether it is expedient to modify the standard height of drawbars for freight equipment cars."

Your committee has made inquiry through a circular issued to all members of the Association, asking for the present height of drawbars adopted by them, with the number of cars of different heights in service, measured when cars were new and empty; the height being represented by the distance from top of rail to center of drawbar. The replies represent 519,897 cars.

It was also asked how much in each case the height given could be increased or diminished in order to conform to a standard which might promise best for general adoption.

In the following statements your committee has shown the effect of adopting at this time a height for drawbars of 33, 34, 34½, 35, 35½, or 36 inches, compiled from information which has been received.

1.

SHOWING RESULT OF CONTINUING 33 INCHES AS THE STANDARD HEIGHT.

Number of cars now 33 inches, and which can be made 33 inches	190,982
Number of cars that cannot be made 33 inches	328,915
Total	519,897
Percentage of cars that can be made 33 inches	36.73

2.

SHOWING RESULT OF MAKING 34 INCHES THE STANDARD HEIGHT.

Number of cars now 34 inches, and which can be made 34 inches	280,555
Number of cars that cannot be made 34 inches	239,342
Total	519,897
Percentage of cars that can be made 34 inches	53.96

3.

SHOWING RESULT OF MAKING 34½ INCHES THE STANDARD HEIGHT.

Number of cars now 34½ inches, and which can be made 34½ inches	270,375
Number of cars that cannot be made 34½ inches	249,522
Total	519,897
Percentage of cars that can be made 34½ inches	52.00

4.

SHOWING RESULT OF MAKING 35 INCHES THE STANDARD HEIGHT.

Number of cars now 35 inches, and which can be made 35 inches	413,567
Number of cars that cannot be made 35 inches	106,330
Total	519,897
Percentage of cars that can be made 35 inches	79.55

5.

SHOWING RESULT OF MAKING 35½ INCHES THE STANDARD HEIGHT.

Number of cars now 35½ inches, and which can be made 35½ inches	275,033
Number of cars that cannot be made 35½ inches	244,864
Total	519,897
Percentage of cars that can be made 35½ inches	52.90

6.

SHOWING RESULT OF MAKING 36 INCHES THE STANDARD HEIGHT.

Number of cars now 36 inches, and which can be made 36 inches	270,571
Number of cars that cannot be made 36 inches	249,326
Total	519,897
Percentage of cars that can be made 36 inches	52.04

SUMMARY.

Percentage of cars that can be made 33 inches	36.73
Percentage of cars that can be made 34 inches	53.96
Percentage of cars that can be made 34½ inches	52.00
Percentage of cars that can be made 35 inches	79.55
Percentage of cars that can be made 35½ inches	52.90
Percentage of cars that can be made 36 inches	52.04

It should be noted that the number of cars reported is somewhat less than half of the total number represented in the Association, and, therefore, your committee feels some hesitation in drawing conclusions from the figures shown; but they can probably be taken as fairly representing the present situation.

It is evident from the summary that there would be less hardships imposed upon railroad companies in going above the present standard than in maintaining it, and, therefore, your committee thinks it is expedient to increase the present standard of 33 inches.

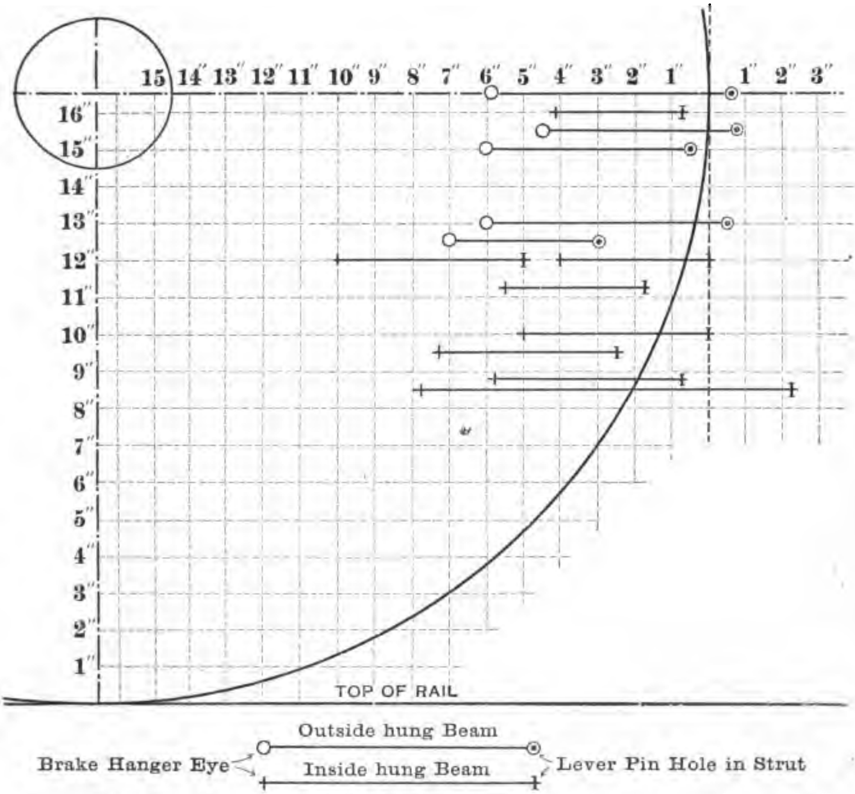
In regard to the iron brake beam, the Committee on Standards, in reporting to the convention of 1892, says:

"Plate 12 now shows the Westinghouse iron brake beam. It is suggested that the drawing should be revised to simply show the center lines of a triangular brake beam, without showing any specific construction of brake beam, but distinctly showing the Christie head and shoe in position, the distance from center to center of brake heads, the location of brake beam strut, the angle of the brake beam lever which passes through the strut," etc.

The standard drawing of the Christie head and shoe shows a head arranged for wooden brake beam, and, therefore, in order to carry out its instructions, your committee should show the Christie head for an iron beam. Unless a particular construction of brake beam be shown, this cannot well be done, and the instructions of your committee do not permit it to recommend any specific form of beam. Furthermore, the design of the brake head, the location of the strut, the lever pin hole in strut and the brake hanger eye depend upon three things: First, the kind of iron beam used. Second, the point at which the beam is hung, with relation to the distance from the rail. Third, the position of the strut, whether horizontal and parallel with the rail, or inclined to it.

The information which the committee has received shows that for different roads the height of center of beam from rail for 33-inch wheels varies from 8½ inches to 16½ inches, and, unless this distance can be made uniform, there seems little prospect of adopting a beam with fixed heads which will in any degree be interchangeable.

The following diagram will illustrate the difficulties concerning the different points at which beams are now hung, and the varying locations of the lever pin holes in strut, and the location of the brake hanger eye, or support.



This shows one-quarter of a 33-inch wheel, divided horizontally and vertically by dotted lines one inch apart, for convenient reference as to locations. The heavy horizontal lines, with circles at the ends, represent location of brake beam struts for outside-hung beams, and the heavy horizontal lines, with crosses at the ends, represent location of struts for inside-hung beams. Looking at the diagram, the left-hand end of strut is the location of brake hanger eye or support, and the right-hand end of the strut shows location of the brake lever pin hole. It will be seen that the lowest strut (which is located in a horizontal line through center of brake beam), is 8½ inches from the rail, and the highest beam as shown by the strut is 16½ inches from the rail. The extreme position for the lever pin hole for outside-hung beams is seen to vary from ¾ of an inch outside of the wheel to 3 inches inside, measured from the vertical line touching the tread of wheel. The extreme position for lever pin hole for inside-hung brake beams is seen to vary from 0 to 2¼ inches outside of wheel, and from ¾ of an inch to 5 inches inside of wheel, starting from the vertical line above referred to.

In the same way it will be noted that the brake hanger eye varies in its location as much as do the locations of the lever pin hole.

If a standard height for center of beam from rail could be adopted, your committee feels that a beam could be designed, and it would be possible to adopt a standard location for holes for brake lever and a location for brake hanger eye. If this is done it will be necessary to decide on a location for center of beam for outside-hung brakes, and for inside-hung brake beams.

Your committee, therefore, thinks it is justified in saying that the instructions received cannot be carried out; and it is hoped that the difficulties in the way have been made entirely clear.

Respectfully submitted,
E. D. Nelson, Chairman,
John Bean,
John H. Rankin,
C. A. Schroyer,
Committee.

Williamsport, Pa., May 1, 1893.

Mr. Waitt: I move that the report be received.

The motion was carried.

The President: I would like to ask Mr. Soule to explain his position in last year's report on this subject.

Mr. Soule: That is fully indicated, Mr. President, by the report of this committee. What is given in fine print represents the position of the committee of last year. I would call attention to the fact that the standard height of drawbar, 33 inches, was not generally adhered to, and that there were indications of a tendency to increase that height. It was recommended, therefore, that the facts should be reviewed by a special committee who should give in their recommendations to the Association on that question. In regard to the matter of brake beam, the stand taken by the committee last year is indicated by the fine print on the foot of sheet six of this report. They would simply call attention to the fact that the standards of the Association illustrate the Westinghouse brake beam, whereas the Westinghouse brake beam is not the standard of the Association.

Mr. Sanderson: I believe this matter of the height of drawbars has been referred to in some recent legislation. If I mistake not, the law as enacted reads that the matter shall be referred to the American Railway Association to designate a standard height, and I think the proper plan for us would be to recommend some standard height, say 35 inches, and send it to the American Railway Association as the recommendation of the Master Car-Builders' Association, for their consideration. I would like to make that as a motion — that the height of 35 inches be sent to the American Railway Association as the recommendation of the Master Car-Builders' Association for a standard height of drawbar.

THE PRESIDENT: I would like to say, gentlemen, although I have not got the information officially, that I understand the American Railway Association has already decided to make 34½ inches the maximum, and 31½ the minimum, which leaves 33 inches, the standard of this Association, the average.

MR. ADAMS: It is filed in the office at Washington already, so that we cannot change that.

MR. SANDERSON: I would like to ask if that refers to the loaded height or empty height?

THE PRESIDENT: That is the maximum and minimum of all.

MR. SANDERSON: Have they finally recommended that height?

THE PRESIDENT: Mr. Adams says it is filed in Washington.

MR. WAITT: I would say that I was authorized by the Central Railway Club, after the American Railway Association had taken action on the height of cars, to communicate with them, and also with the secretary of the Interstate Commerce Commission, asking for a little further information. The action taken by the American Railway Association recommended that the height of cars from top of rail to center of drawbar should be 34½ inches. It did not state, as we do in our standard, that it should be when the car was empty, neither does it state whether 34½ inches would be a mean, maximum or minimum height. It did state that the maximum of variation should be 3 inches, and the Central Railway Club authorized inquiry to be made as to whether the 34½ was the maximum or minimum height. The letters were acknowledged by the secretaries of both the American Railway Association and the Interstate Commerce Commission, and were referred to President Haines, of the American Railway Association, for action to be taken. No report has been received, and I have been informed that no official action has been taken with regard to that. I understand from our President that he has learned from an unofficial source that 34½ is intended to be the maximum. Yet, I believe, that has never been officially stated. It would seem, if 34½ is to be the maximum and 31½ the minimum, that it would be well for our standard on the books of the Association to correspond with the law which will be in force, and I would move, in connection with the recommendation of the committee, that the height of drawbar should be increased, that the height, as it shall be officially announced by the Interstate Commerce Commission within the next month or two, shall be submitted to the Association by letter ballot as the standard of the Association. That will probably be 34½ maximum and 31½ minimum.

MR. MACKENZIE: I did not quite get the motion.

MR. CLOUD: The motion is that the height as it shall be officially announced by the Secretary of the Interstate Commerce Commission inside of a month or two, shall be submitted to letter ballot by the Association as to whether this Association will adopt that as a standard in place of the present standard.

MR. MACKENZIE: It seems to me that is rather a queer move, Mr. President. If the American Railway Association adopt a height and the Interstate Commerce Commission says that is what goes, I do not know what the Master Car-Builders' Association will have to do with it. It seems to me that it would have been very much better to have continued this committee and let them put themselves in communication with the American Railway Association, and after they have got suitable reports from them, report their proceedings to this Association, and then submit it to letter ballot and adopt the report of the committee. In addition to that I want to call attention to one thing that occurs to me—the height of brake attachments from the rail. I think that we are all wrong in trying to regulate the height of brake attachments from the rail. I do not know whether I am wandering from the subject, but the height of drawbars certainly has got something to do with it. It occurs to me that the better way to handle that matter, and I would suggest that it be embodied in the report of the committee or in the instructions to the committee, that the height be regulated from the bottom of the car so as to get somewhere near a standard length of hanger. Now we have got a variation here of 3 inches. I am putting my brake beams up three inches lower——.

MR. WAITT: I rise to a point of order. The talk is not on the motion. Although I have no objection personally to the question of brake beams, yet the motion was on the standard height of drawbars.

MR. MACKENZIE: I submitted the question to the Chairman.

THE PRESIDENT: The point is sustained. We are on the height of drawbars.

Mr. Mackenzie: I see that this report of the committee says that while they show the height of drawbars they also give considerable information concerning the height of brake attachments, and if the report of the committee is sustained I do not know why my remarks should not be.

The President: That matter would come in under another motion.

Mr. Mackenzie: I will amend Mr. Waitt's motion—that the committee be continued and that they put themselves in communication with the American Railway Superintendents' Association and report what action they take to this convention.

The President: Do you accept that amendment?

Mr. Waitt: No, sir. I think there is objection to having the standard of the Association 33 inches, and the standard of the American Railway Association, which we have to live up to, 34½ inches, which would be the case for a year.

Mr. Sinclair: I suggest that Mr. Mackenzie has made a mistake in his motion. He speaks of the Railway Superintendents' Association. It is not the Railway Superintendents' Association, but the Railway Association that is dealing with the question.

Mr. Soule: I understood Mr. Waitt's motion to be that when the Interstate Commerce Commission has announced this standard that it shall be submitted to letter ballot for adoption by this Association. I understood Mr. Mackenzie's motion to be that the committee should be continued with instructions to confer with the American Railway Association. But if it is in order I will offer a substitute motion, because I think that this matter ought to be acted on quickly if we desire that the deliberations of this Association shall cut any figure in the determination of a standard. Therefore I offer a substitute motion that we should proceed to a consideration of this question and should ascertain what the sentiment of this Association is as regards the proper height of drawbars, and that just as soon as that sentiment has been ascertained, the secretary should be instructed to telegraph to the president of the American Railway Association. I have no doubt that when the American Railway Association deliberated on this question they were not advised that this Association had any intention of changing their standard height of drawbar. I have no doubt that they simply referred to our Proceedings and saw that 33 inches was the standard, and did not take into consideration the fact that we were considering the increase of the height. I have no doubt that the American Railway Association would be very glad to receive a recommendation from this Association, and would be even willing to revise their recommendation to the Interstate Commerce Commission. Therefore, if the chair decides that the substitute motion is in order, I would move that we proceed to the consideration of this question and ascertain what the sentiment of this Association is as to the proper height of drawbar; and that after that height has been ascertained the Secretary should be instructed to communicate our findings to the president of the American Railway Association.

MR. WAITT: I withdraw my motion and second Mr. Soule's motion.

MR. RHODES: I seconded Mr. Waitt's motion and I have not consented to have it withdrawn. I would like to say something on the question before it is quite decided by the mover to withdraw the motion. I do not quite think with Mr. Soule that the American Railway Association has acted without consulting with the members of the Master Car-Builders' Association. I know it is not so with reference to several lines in the West. They did consult with the Master Car-Builders' Association and ascertained very carefully what they could do — whether they could go higher, whether they could go lower; and I believe that what they have drawn up is what will be found by letter ballot to be the general consensus of opinion. Those who have the 35-inch height can come down to a maximum of 34½, and those who have now the 33-inch can keep their height up above 31½; and that preliminary work having been gone through, it seemed to me that Mr. Waitt's motion was a very good one and would really just be deciding what will be confirmed by letter ballot. I doubt very much whether any opinion of the present members here will be nearer what the opinion of the letter ballot will be. It may be quite different. I only ask to have that considered before the mover consents to withdraw his motion.

MR. ADAMS: I would like to say, Mr. President, that I agree with Mr. Rhodes precisely in regard to the action of the American Railway Association. I think they have considered this matter very carefully. I myself personally had an interview with Colonel Haines and talked this matter over with him quite extensively, and he expressed himself very cordially in harmony with the action of the Master Car-Builders'

Association. He said he was aware that they had fixed the height at 33 inches, which, he thought, was a very fair position and good dimensions. He said he had been having his own cars built previously 34½, but the more recent cars that he had ordered built were fixed at 33 as the maximum height, and he had no question whatever that that would be the recommended height as the average height of cars. I saw in the paper that a decision had been made by the American Railway Association and had been sent to Washington and already filed. Now this thing has been done. They have considered it carefully and have given it abundance of time, and I think it would be rather presumptuous on our part to ask them to make a change. It is official; it is United States Government, and we have got to conform to it. I cannot see any other way, while I have no objection to their making communications, as much as they are of a mind to, with the Railway Association or the Interstate Commerce Commission.

THE PRESIDENT; Do I understand that Mr. Rhodes objects to withdrawing the motion?

MR. RHODES: No. I simply wanted to have that matter considered before withdrawing the motion. If the mover will advise with me I will tell him whether I am willing to have it withdrawn or not.

MR. WAITT: My idea was not to withdraw it permanently, but only until this motion of Mr. Soule's could be discussed. I thought it might be wise to let the other motion have the preference, for just this reason — the Interstate Commerce Commission have not yet officially announced to the railroads what they must conform to in the future. The American Railway Association have given merely a height, 34½ inches, but have not stated whether it should be the height when the car is empty or loaded, neither have they stated whether it shall be maximum or minimum. I have consulted with one of the members of the Committee on Safety Appliances who reported that height to the American Railway Association, and he was of the opinion that the intention of the committee was that all the cars should be raised, and that 34½ inches should be the standard height instead of our 33 inches that we now have. One of the members of the committee thought that way and another thought that 33 inches was the average and 34½ inches was the maximum, instead of 34½ inches being the average. There seemed to be this misunderstanding on the part of different members of the committee of the American Railway Association, and it seemed to me that their attention ought to be called to the fact that it was left indefinite, and there would be difference in understanding and difference in practice. So that the Central Railway Club communicated with them and it seems that the matter is under consideration, and before the railroads are informed what heights they are to conform to, they will be informed whether 34½ inches is a maximum height or an average height. It seems that before that recommendation is given out, any recommendation of this Association might have weight with the American Railway Association, and it seems to me very proper that the suggestion should be sent to them of the sentiment of this Association. So I should like to see Mr. Soule's motion put and the sentiment of the Association taken and the communication sent to the American Railway Association to that effect. Then the motion to submit to letter ballot whatever the Interstate Commerce Commission promulgates would seem to be very proper, so as to make our standard on our books conform with what we have to live up to.

MR. RHODES: I consent to the withdrawal of it with that explanation.

MR. CLOUD: I would say, as bearing on this point, that I hold here a letter signed by Edward A. Moseley, dated June 10, and addressed to one of the railway papers, in which the first sentence is as follows: "The Commission is about to promulgate the notice to carriers of the standard height of drawbars for freight cars as certified to the Commission by the American Railway Association under the provisions of the Act of Congress approved March 2, 1892." So that the matter seems to have been settled.

MR. MCCARTY: It might be as well to state that the committee on this subject did meet the American Railway Association and there was an incidental consultation only, so that 34½ inches, while it was not definitely arrived at at the time of the meeting, after the consultation it was concluded that that would be a satisfactory height. It was understood that they would expect some information from the Master Car-Builders' Association after it convened because of the fact that this committee did not feel the freedom to make any suggestions without the authority of the Association, so it would seem natural that something should be done in accordance with Mr. Waitt's views.

MR. RHODES: In view of Mr. Waitt's explanation I withdraw my objection.

MR. ADAMS: I think there is no question at all but what the Railway Association understood the height to be the height of cars empty. The reason for latitude given was mainly in view of the difference in the use of different classes of springs under the cars. It was understood by all, and is known well enough by all, that with certain kinds of springs a car will vary a great deal more than it will with other springs, and to make provision for that difficulty they made this extreme limit. It was also understood pretty well by the Association, I think, that this question had been up before; that it had been before the Association twice before with a very earnest attempt to get the height of cars up to a considerably higher standard than they are now, and in both instances they have failed. This is another effort to raise the height of drawbars. As I said yesterday, I do not care about the matter one way or another. But the higher we get our cars, it strikes me, it is injurious. I believe a car should be as low as it can be drawn and safe on the running gear and everything as convenient as possible. While we can get cars just as high as we are a mind to, we cannot get them down always. We are about as low now as we can be conveniently with our running gear, and there is no great difficulty at the present time. There is latitude enough in it, as the Railway Association has fixed upon it, and I cannot see, from my standpoint, how we are going to have any great influence about the matter anyway. We are a small institution compared with the Government, and it does not strike me at this time very favorably that we should make a very great deal of effort to suggest to it. I think we had better accept the situation just as it is and adopt the recommendations of the American Railway Association for the height of draft. It seems to me that would come in harmony with everything and we would build right in that line.

THE PRESIDENT: The Secretary will read the motion now before the house.

MR. CLOUD: The substitute motion which is before us is that we proceed to the consideration of the subject of height of drawbars and ascertain what the sentiment of the Association is, and advise the president of the American Railway Association.

The motion was carried.

Mr. Waitt: In order to get this matter now before the Association I would move that it is the sentiment of this Association that their understanding of the decision of the American Railway Association is that 34½ inches is the maximum height and 31½ inches is intended to be the minimum height for drawbars when measured from top of rail to center of drawbar when the cars are empty.

Mr. Harrison: I second that motion.

Mr. Rhodes: It seems to me that that is hardly the intention of the American Railway Association. The height was 34½ inches maximum and 31½ inches minimum, or as they state it, 34½ inches with a three-inch variation. Now the maximum must be empty, and the minimum must be loaded. I shall vote with Mr. Waitt if he will let that minimum come in with the load.

Mr. Waitt: I accept that. That was an oversight on my part. I intended it.

Mr. Marden: It would seem to me from Section 5 of the Public Act which was passed March 2, that the American Railway Association was to fix upon a standard height of drawbar and then to give the variation from that. It reads as follows:

> That within ninety days from the passage of this Act the American Railway Association is authorized hereby to designate to the Interstate Commerce Commission the standard height of drawbars for freight cars measured perpendicular from the level of the tops of the rails to the centers of the drawbars for each of the special gauges of the railroads in use in the United States, and shall fix a maximum variation from such standard height to be allowed between the drawbars of empty and loaded cars.

Mr. Rhodes: Before starting out for this meeting of the Association, I measured the cars of about twenty different roads, and I found that there was scarcely one that exceeded 34 inches. I gave the representative of the Railway Association a list of the cars and he went to the association with that and also with other information I had gathered in regard to the matter. Now, as I understand it, we have got the word maximum misplaced, unless he has got it misplaced. He said that 34½ inches should be a standard height, with a maximum variation of 3 inches, and he was not at all clear whether 34½ inches was the maximum height or not. He said that the matter was placed entirely in the hands of the Executive Committee, and that they had got to report before the 1st of July, and he thought that they might be induced to change that 34½ inches — if it was now the maximum — they could be induced to make it a standard with a variation of an inch and a half either way from that. Now, the only thing I have to say in regard to this is, that if the Executive Committee has decided that 34½ inches shall be a standard height with a variation of an inch and a half either way from that, will not any communication from us that gives 34½ inches as a maximum and 31½ as a minimum indicate to them that it is our preference that they shall keep down to the 34½ for a maximum when they might be induced to adopt it as a standard? I find that the majority of cars are built with equal arch bars top and bottom, and that with those arch bars with a 17-inch column and anything like a decent body bolster, there is quite an offset in the draft timbers to get on to the 34½ inches at all. I would not like to intimate that we would like them to come down to 34½ inches maximum and 31½ inches minimum, if they have established the 34½-inch average as a standard with a variation above and below. That is the only objection I would have to the introduction of the minimum.

Mr. Soule: I agree with Mr. Rhodes in thinking that the easiest escape out of this dilemma is to assume that the American Railway Association meant to recommend 34½ inches as the standard height. We must have standard height of drawbar and the variation from that height is another thing, because in our shop practice we are governed only by standard height. We want to know in designing cars and in constructing and repairing them what is the standard height. I think there are two reasons why we ought to express our sentiments in favor of 34½ as the standard height; one, because the action of the American Railway Association can be considered as indicating that that is their preference, also because the report of this committee leans that way, and Mr. Rhodes says that it was impossible to ascertain the sentiment of this Association until we actually got a letter ballot. I do not agree with him on that, because this report of the committee, which is based on the circular, is a very clear and definite forecast of what the result of a letter ballot would be. That shows that representatives of seventy-nine per cent of the cars controlled by roads in this Association say that they can raise the height of those cars to 35 inches, and to make 34½ inches as the standard would be directly in line with the findings of this committee.

Another point is that besides recommending definitely a standard height it is also in order to recommend variations from that standard, but I do not think it would be right to make the variations the same above and below that standard. If we select a certain figure as our standard height of drawbar I claim that we should allow a little variation above that and a great deal more variation below it, owing to the conditions with which you are all familiar. Therefore, I offer as an amendment to Mr. Waitt's motion that it is the sentiment of this Association that 34½ inches should be the standard height of drawbar and that the maximum and minimum variations should be 35½ inches and 32½ inches. That allows 1 inch variation above the maximum and 2 inches below it.

MR. HENNESSEY: I do not quite agree with the gentleman who has just spoken. My experience is that the average car in America is not 33 inches high. Our cars are 35 inches when new; but in two years they are not 33 inches, and I think that is the case with the cars in general. Now I would agree with the last remarks made by the gentleman that 34½ inches is probably the standard. But I would not agree to have the minimum less than 31½. If we do, I think we are going to have a great deal of expense in raising our old cars. I think that is the experience of everybody. I believe it is the general experience that the old cars that have been in service for the last eight or ten years are below 33 inches at the present time.

THE PRESIDENT: The Secretary will read the motion.

MR. CLOUD: The motion is that the Association understands that 34½ inches is intended by the Railway Association to be the maximum height or height when the car is new and empty, measured from top of rails to center of drawbar, and that 31½ inches is intended to be the minimum height which can be run in conformity with the law under any circumstances.

MR. SOULE: I had a misunderstanding about Mr. Waitt's motion and I will withdraw my substitute.

THE PRESIDENT: Gentlemen, you have heard the motion. All in favor will show their consent by saying aye—opposed no.

The motion was carried.

MR. WAITT: Now I would move that the Secretary be authorized to communicate the motion that has just been passed to the Secretary of the American Railway Association and also to the Secretary of the Interstate Commerce Commission by wire, because there is no time to be lost in regard to it.

THE PRESIDENT: Part of that motion was covered in one of the other motions so far as relates to the American Railway Association.

It will be necessary for the Association to decide in regard to a letter ballot on this subject.

Mr. Waitt: I would now put in the original motion that was seconded by Mr. Rhodes — that the heights that are promulgated by the Interstate Commerce Commission be submitted to letter ballot, so that our standards on our books may be made to conform to the standards we have to work with.

Mr. Lentz: I second the motion.

The President: The motion is that the heights which are promulgated by the Interstate Commerce Commission be submitted to letter ballot.

The motion was carried.

The President: Now we want to take up the balance of the committee's report on brake beams.

Mr. Mackenzie: I understand that Mr. Rhodes has something to say on this question, and has gone after some papers.

The President (addressing Mr. Rhodes, who had just entered the room): Have you anything to offer in regard to height of brake beams?

Mr. Rhodes: I have something more to say about the height of drawbars.

The President: There is no objection to your doing so.

Mr. Rhodes: Has anything been said on the height of brake beams?

The President: No. We want to take up the balance of the report now and dispose of it.

Mr. Rhodes: Might I ask to hear what the recommendation was —what action was taken by the Association?

Mr. Cloud: The Secretary was instructed to advise the president of the American Railway Association that this Association understands that in their recommendation 34½ inches is intended by them to be the maximum height, or height when a car is new and empty, measured from top of rail to center of drawbar, and that 31½ is intended to be the minimum height which can be run in conformity with the law under any circumstances. And the Association has also instructed the Secretary to send out a letter ballot submitting the heights which are announced by the Interstate Commerce Commission as the standard adopted by the American Railway Association or [illegible] as standard by the Master Car-Builders' Association.

Mr. [illegible]: If the convention will allow me I would like to say something on this motion.

The President: [illegible]

Mr. [illegible]: I move that we [illegible] this motion.

Mr. [illegible]: [illegible] recommendation on the [illegible] if the convention would allow me to say something on this motion.

The President: [illegible] Mr. [illegible] will be heard.

Mr. [illegible]: [illegible] the Master Car-Builders [illegible] answer these circulars in the way they ought, and therefore if you draw deductions from the answers that you receive you are very apt to get a wrong impression of what actually is the case. Now, in point of fact, the committee which made this report and which has given these averages, reports, I think, that seventy-nine per cent of the cars can be made 33 inches. They control fifty per cent of the cars, so that it is not fair to assume that that represents the condition of the cars at large which we are dealing with. I am anxious to make this talk because I want the American Railway Association to understand that if they raise the maximum standard beyond 34½ inches they are going to get us all into very serious difficulty, and I hope that that will be thoroughly impressed upon them and that when we take any letter ballot on this question that we will look at it in the same way, and those who are up high will have to come down a little, and those who are down low will have to come up. The practice at the shops, you know, is not to turn cars out at your standard height. It is always a little higher. So it would be fair under those conditions to have those that are low come up a little and those that are high come down a little, and in that way, I believe, we will strike the best average and get the best results.

Mr. Mackenzie: Did I understand the instructions to the Secretary that the minimum height should be loaded, 31½ inches?

Mr. Cloud: 31½ is the minimum height that can be run in accordance with the law under any circumstances.

Mr. Marshall: Is there a motion before the house?

The President: There is no motion. We want to take up the brake beam portion of the committee's report.

Mr. Allen: If in order, I would like to ask a few questions.

The President: We would like to have a motion, Mr. Allen.

Mr. Allen: I have no motion; I simply want to ask a few questions.

The President: Could you bring it up at 12 o'clock?

Mr. Allen: I go away at 12:30.

The President: If there is no objection, then you may proceed with your questions.

Mr. Allen: The question I wanted to ask is this: Wouldn't it be well, on this question of drawbars, to take up all cars together, coaches, baggage cars and freight cars, and make coaches 36 inches;

baggage cars and express cars 35, and freight cars 34, and allow the vertical motion on a coach to be 3 inches, and the vertical motion on a baggage car to be 2 inches, and the vertical motion on a freight car an inch, under load. We are putting on our road, 34 for freight, 35 for baggage, and 36 for coaches.

THE PRESIDENT: It would take considerable time, Mr. Allen, to answer those questions. It might be profitable for the 12 o'clock discussion.

MR. POTTER: I move to reconsider Mr. Waitt's motion.

The motion was seconded.

MR. CLOUD: I would like to know which motion of Mr. Waitt's is referred to.

MR. POTTER: This refers to advising the Railway Association in regard to our understanding of the height of drawbars.

MR. CLOUD: The motion which it is moved to reconsider is that the Master Car-Builders' Association understands that 34½ inches is intended by the American Railway Association to be the maximum height when the car is new and empty, measured from top of rail to center of drawbar, and that 31½ inches is the minimum height which can run in conformity with the law under any circumstances.

MR. ADAMS: It seems to me we are wasting time reconsidering things that we have passed on. Why can't we go ahead and do our business.

The motion to reconsider was lost.

MR. WAITT: I do not want to make all the motions, and yet I want to see these things go along. In the report of the committee on brake beams it seems that they do not consider it possible to adopt a standard illustration of brake beams. We have now on our Association records the Westinghouse beam, which is not used to any extent, and I do not think it is being used on new cars at all. It seems to me, in view of the committee's report, that we should drop that illustration from our standard, and as there cannot be any harmony brought about, at the present time at least, as to the standard brake beam, I would move that we drop the illustration of the Westinghouse beam, with the figures given, from our standards to be submitted to letter ballot.

The motion was carried.

MR. RHODES: The following is in the report of the committee:

If a standard height for center of beam from rail could be adopted, your committee feels that a beam could be designed, and it would be possible to adopt a standard location for holes for brake hanger eye. If this is done it will be necessary to decide on a location for center of beam for outside-hung brakes, and for inside-hung brake beams.

It seems to me this is quite an important matter, just as important as the adoption of standard brakes or standard couplers, and I would move that the Executive Committee be recommended to appoint a committee to report on this paragraph on a standard height and location for center of beam for outside-hung brakes.

MR. WAITT: To save time, I would say, as one of the members of the Committee on Subjects, that we will recommend such committee to be appointed.

THE PRESIDENT: The committee will embody that in subjects. Is there anything further with respect to brake beams? If not we will go to the next committee. The next report will be the third on the list—Truck Pedestals and Safety Chains.

MR. CLOUD: The committee has not handed in any report to the Secretary. The chairman, Mr. Bissell, may be present. If he is, we will hear from him.

THE PRESIDENT: Is Mr. McWood here or Mr. Mitchell?

MR. MCWOOD: I would like to say, Mr. President, that I was duly notified by the Secretary that I was on this committee. As Mr. Bissell, the chairman, did not summon me, the matter was dropped. I supposed Mr. Bissell would be here with something all cut and dried for me to sign.

MR. MITCHELL: Mr. President, I would say that I was duly notified by the Secretary that I was appointed on the committee. But as I was the last man on the committee I supposed the chairman was getting up a report and the only thing I would have to do would be to approve of it. But I was not notified until May 30, that anything was expected from me and I did not take time then to get up anything.

THE PRESIDENT: Mr. Bissell has just entered the room, and as he is chairman of this committee, we would like to have his report.

MR. BISSELL: This is being taken rather sudden. I have not got down to business yet. Please put it off until tomorrow or Saturday.

THE PRESIDENT: As it seems we will not get any report from Committee No. 3, we will take up No. 4, on "Protection of Trainmen and Lettering Fast Freight Line Cars."

The Secretary read the following report:

REPORT OF THE COMMITTEE ON PROTECTION OF TRAINMEN AND LETTERING FAST FREIGHT LINE CARS.

To the President and Members of the Master Car-Builders' Association:

Your committee appointed to consider the subjects of Protection of Trainmen and Lettering Fast Freight Line Cars, would respectfully state that when the present committee began its investigation it found both subjects had been canvassed so thoroughly by previous committees that little room was left for improvement in the reports already submitted to the Association for consideration.

PROTECTION OF TRAINMEN FROM ACCIDENTS.

Under the above head the committee would respectfully recommend for adoption certain additions, as noted below, to the present standards for Protection of Trainmen from Accidents, without any further change.

First—Under Running Boards. This paragraph to be made to read as follows, in which the changes are indicated by italics:

"The ends of the running boards of box cars to be made to project over the ends of the car, so that the minimum distance between the ends of those on adjoining cars will not be over 12 inches; *and that the running boards be made in four sections, each board 1 inch thick by 5½ wide, dressed, 1 inch space between each board, total width of running board to be 25 inches, with suitable number of cleats.* The projecting ends to be supported on two brackets, at each end of the car, made of ⅜ by 1¼ inch iron, with a hardwood cleat 3 by 1 inch on upper ends, fastened with one ½-inch bolt and nut in each bracket. The lower end of each bracket to be fastened to the end of the car with two ½-inch bolts and nuts."

Second—Under Steps. The second paragraph to be made to read as follows, in which the changes are indicated by italics:

"A hand-hold to be attached to the side of the car above each step—to be placed horizontally two feet above the bottom of the sills *wherever possible, and to be located lower down wherever the design of car will not admit of the above location being accurately adhered to.* The hand-hold to be made of ⅝-inch round iron, two feet long in the clear between the ends; to have two and one-half inches clear space between it and the sides of the car; to be fastened with one ½-inch lag screw in each end, screwed not less than two inches into the framing. Another handle of the same size, and fastened in the same way, to be attached horizontally to the end of the car the same distance above the sills, and on the opposite side of the ladder."

Third—Under Ladder and Handles. The whole matter to read as follows, in which the recommendations now shown in the standards for ladder and handles are incorporated as standards, and in which an additional paragraph is made as printed in italics with figure illustrating same.

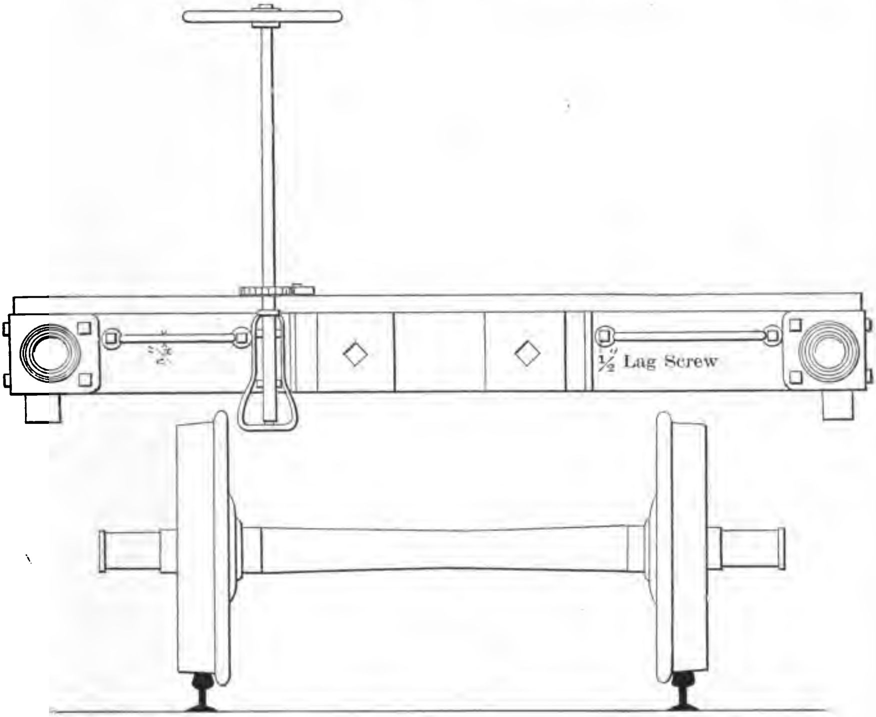
"LADDER AND HANDLES.

"That each box and stock car have two ladders, not less than five steps in each ladder, made of ⅝-inch round iron, projecting three and one-half inches from the

siding, securely fastened to each end at diagonal corners, with a handle directly over the ladders on the roof, and that the lower step of the ladders have a guard or projection in order to prevent men slipping when swinging around the end of the car to get on the step.

"When ladders are on the end of the car a handle should be placed horizontally about twenty-four inches above the lower edge of sill on side of car above the steps to enable trainmen to get a firm hold before or while using the steps; also when the ladder is on end of car a handle should be placed on opposite corner from the ladder, and when ladders are on the side of car, two such handles should be placed on each end of the car about twenty-four inches above the bottom of the sill.

"*On all freight cars, such as flat cars, etc., not supplied with ladders, two (2) handles are to be placed at each end of car as shown in Fig. 1, unless it be decided preferable to locate them higher up in certain constructions, such as coal cars, etc.*"



SYSTEM OF LETTERING AND NUMBERING FAST FREIGHT LINE CARS.

Under this head your committee would recommend that the standards as they now stand should remain unaltered with one exception, namely, that paragraph No. 2, reading "doors should have no marks whatever," be stricken out, and that a new paragraph be inserted here, reading as follows:

"*Side doors to bear the initials of the road to which the car belongs, or the name of the line in which the car is used, together with the number of the car.*"

Respectfully submitted,
E. P. LORD, Chairman,
SAMUEL IRVIN,
THOMAS SUTHERLAND,
Committee.

PITTSBURGH, PA., May 25, 1893.

MR. WAITT: I move that the report be received and opened for discussion.

The motion was carried.

MR. SOULE: I would like to call attention to the fact that there is a possible chance for a contradiction between this report and the report of the Committee on Standards. In its report, the Committee on Standards said, under the head of the Protection of Trainmen, "It is suggested that this standard should be carefully reconsidered and revised with the idea of eliminating the dimensions of detail parts and confining the recommendations of practice for the safety of trainmen to a few general suggestions without restrictions to certain dimensions." And in making its report, the present Committee on the Protection of Trainmen has recommended certain details with definite dimensions of the parts, and therefore, in order to avoid any contradiction and pending the final decision of the Association on the report of the Committee on Standards as to be determined by letter ballot, I would move that this present Committee on the Protection of Trainmen and the Lettering of Fast Freight Line Cars be continued, with instructions to report next year, and then modify their findings in accordance with the action of the convention in this matter of the report of the Committee on Standards.

The motion was seconded.

MR. LEEDS: Mr. Chairman, it seems to me that this is something that it is absolutely essential we should have dimensions on. As I understand, the law calls for the putting on of these handles or grab-irons, but I cannot exactly agree with the committee's report on gondolas—to put the hand-hold on the end sill—that is the way I understood the reading of it. I think that we should have an established height inasmuch as the law calls on us to apply these handles, and the measurements should be decided on in order that we may be able to go before any court and satisfy it that we have conformed to custom and usage.

THE PRESIDENT ; I do not think it is the intention to place handholds on the end of the gondola. You could put the hand-hold on the end of the gondola above the end sill.

MR. LEEDS : Yes, and I would like to have that idea established.

MR. BLACKALL : I would like to inquire from the committee what the object was in putting that handle on the end sill. It seems to me it is about as dangerous a device as could be attached to a car. I would like to know what the object of the committee was in recommending a handle placed horizontally on the end of a car.

THE PRESIDENT : I think the idea of putting that hand-hold there was to meet the requirements of the Coupler Bill. Our standards did not have any hand-holds, except for stock and box cars.

MR. HENNESSEY : There is one thing I would like to call the attention of the committee to. Would they consider that the uncoupling device on the M. C.-B. coupler would answer for one of the handles? It runs clear across the end of the car on one side.

MR. LEEDS : I object to this going over to another year. It ought to be settled now. I have studied a good deal how to get a good hand-hold on the end of a flat car without endangering the lives of the men in coupling. Of course, it is claimed that with an automatic coupler they will not need to go there, but they will go in there just the same. I have decided that the only way is to chamfer a corner of the end plank so as to give room for the handle, and have the rod on a line with the edge of the plank. I do not see any other device that is not dangerous to trainmen because of the 2½ inches clearance back of the handle and the ⅝-inch rods. With broken drawbars and deadwoods coming together, there is no room for the men in there without being cut in two by the various safety appliances we are putting on. As to the heights and so on, I would like to see that established, in order that we may have something, in case of accident, that is established as the custom of the country.

THE PRESIDENT : I would like to say that it is important that this matter of hand-holds should be settled very quickly to meet the requirements of the Coupler Bill.

MR. WEST : I agree with Mr. Leeds that this is too important a matter to put over another year. I think we ought to agree on some size and dimensions that would be perfectly interchangeable.

MR. MARDEN: It seems that there are some objections to acting on this report on account of its not agreeing with the report of the Committee on Standards. I would suggest that perhaps we might put it off until tomorrow morning, and authorize an interview between the two committees and request them to put this report in such shape that we can act upon it, and make it agree with the report of the Committee on Standards.

THE PRESIDENT: Do you make a motion to that effect?

MR. MARDEN: Unless some other way can be seen out of it.

MR. MACKENZIE: I think that the suggestion offered by Mr. Leeds is a very good one, that is the cutting back of the projection of the flooring where the handle is fastened to the sill — cut it out so as to set the handle further into the car. Now, as he very properly says, if we put this handle on, it will take six inches of your distance away, which is a very dangerous proposition, I think, and by cutting back the flooring and giving them 2½ inches there you will only take away then two inches of your space, which would lessen that materially. I think that the report of the committee should be handled at the present time. So far as the grab-iron is concerned, I believe that the grab-iron on the end of a flat car is just as necessary as on the end of a box car. What chance has a man to protect himself if he makes a miss-step between two flat cars if there is no grab-iron there? Another suggestion has been made, and that is where the M. C.-B. coupler is placed that the uncoupling device might be used as a grab-iron on one side of the car. I also want to suggest, Mr. Chairman, that the location of the grab-iron on gondolas be in the same position as upon the end of a box car or stock cars. This, of course, would not answer where you have drop-end gondolas, because you could not put your load upon the gate when you drop it down. There would be something there to be considered.

THE PRESIDENT: I believe the motion to postpone was not seconded.

MR. SANDERSON: I seconded it.

THE PRESIDENT: The motion has been made to postpone the consideration of this report until tomorrow morning.

Mr. Marden: If that motion is to be considered I should prefer to put it in another way, as directing this committee to confer with the Committee on Standards, and to put their report in such a condition as it can be received by the Association, and make it the order of business the first thing tomorrow morning.

Mr. Mackenzie: I think that may be well enough so far as the lettering of the cars is concerned, but I do not think the conferring of the two committees will have anything to do with the grab-irons.

The President: The motion to postpone is in order.

Mr. Mackenzie: Has it been seconded?

The President: Yes, sir.

Mr. Morris: I agree with Mr. Leeds and also with Mr. Marden on this question of hand-holds, and for the information of the Association I would like to read some extracts from the Proceedings of the American Railway Association on this subject, if it is in order. The extract is as follows:

> The Committee on Safety Appliances beg leave to submit the following report: It has had under careful consideration the provisions of Sections 4 and 5 of the Act of Congress approved March 2, 1893, entitled "An Act to promote the safety of employés and travelers on railroads by compelling common carriers engaged in interstate commerce to equip their cars with automatic couplers and continuous brakes and their locomotives with driving-wheel brakes for other purposes." In regard to Section 4 it was resolved to recommend that the Association adopt hand-holds and grab-irons, and as suggested in the report of the Master Car-Builders' Association, published in the Proceedings of the Association for 1892, pages 283, 284 and 285. These standards did not provide for the handles on gondolas or flat cars, from which report the following is an extract: "When ladders are on the end of the car a handle should be placed horizontally about twenty-four inches above the lower edge of sill on side of car above the steps, to enable trainmen to get a firm hold before or while using the step. Also when the ladder is on end of car a handle should be placed on opposite corner from the ladder, and when ladders are on the side of car two such handles should be placed on each end of the car, about twenty-four inches above the bottom of sill, thus enabling train and yard men to sustain themselves while making couplings."

That is all that refers to the grab-iron and I thought it would be well to call your attention to it.

The President: The Secretary will read the motion to postpone as it now stands.

Mr. Cloud: It is to postpone the consideration of this report until tomorrow, directing the committee which made the report to confer with last year's Committee on Standards and report to the convention tomorrow.

The motion was carried.

Mr. Marden: I would suggest that these two committees consider Mr. Leeds' proposition as to the chamfering off of the end-sill, as I think that is the reasonable thing to do.

Mr. Waitt: As Mr. Lord of the committee is not present, I would make the motion that Mr. Leeds be requested to act on that committee with the other two.

The motion was carried.

The President: Is the Committee on Tests for M. C.-B. Couplers ready to report?

Mr. Rhodes: Mr. Chairman, I ought to say in explanation of my having these papers that one of the members of the Committee on Couplers resigned from his position and I was notified by the Secretary to act on the committee. Our chairman is unavoidably absent, but he has sent me his report and asked that I read it before the Association.

Mr. Cloud: The report is not in print and there are no copies for distribution, as it has not yet been handed to the Secretary.

The President: Mr. Rhodes will read the report of the Committee on Tests of M. C.-B. Couplers.

Mr. Rhodes: There is a use of terms in this report that I ought to explain. Where coupler is referred to, it means the coupler with the knuckle inserted. Where knuckle is referred to, it simply means the knuckle. Where drawbar is referred to, it simply means the drawbar. So that where you find drawbar here, it means the drawbar without the knuckle.

Mr. Rhodes then read the report, as follows:

REPORT OF COMMITTEE ON M. C.-B. AUTOMATIC COUPLER STANDARDS AND LIMITS.

To the President and Members Master Car-Builders' Association:

Your committee appointed to investigate the specifications for the M. C.-B. couplers would respectfully report as follows:

In pursuance of the plan outlined in last year's report, the committee placed itself in communication with the government authorities in Washington, obtaining their hearty approval and coöperation in the matter of the proposed Watertown Arsenal tests. As soon as the preliminary arrangements were all completed, your committee met and drafted a schedule of tests, as follows:

M. C.-B. COUPLER TESTS.

"DROP TESTS—Altoona, Pennsylvania, to commence May 11.

"PULLING TESTS—Watertown, Massachusetts, U. S. Arsenal, to commence May 16.

"NOTE.—Trains leave Boston by the Fitchburg R. R. at 8:30 A.M., arriving at Union Market Station at 9:00 o'clock.

"SHIPPING INSTRUCTIONS.

"Four couplers should be sent to Altoona, Pennsylvania, care of Mr. J. M. Wallis, for drop tests.

"Eight couplers should be sent to Watertown Arsenal, Union Market Station, Fitchburg R. R., Watertown, Massachusetts, care of Commanding Officer, for pulling tests.

"COUPLER COMPANIES.

"1. Each company entering the test will be required to furnish the following information:

"(a.) Kind of material in drawbar.
"(b.) " " " " knuckle.
"(c.) " " " " pivot pin.
"(d.) " " " " lock.

"2. State whether drawbars were specially made for test purposes.

"3. If drawbars or parts of drawbars are made of steel, state whether by Bessemer or Open Hearth process, and percentage of carbon.

"DESCRIPTION OF TESTS.

"1.. Each company's couplers shall be marked 1, 2, 3, 4, 5, etc., for convenience in record.

"2. Scales shall be provided for weighing drawbars and knuckles.

"3. The number of parts in each drawbar shall be recorded, every washer, pin and key to count as a separate part.

" 4. All drawbars shall be weighed before tests with knuckle, lock and pin complete.

" 5. All knuckles shall be removed and weighed separately.

" 6. It shall be stated whether drawbars to be tested conform in contour lines with the M. C.-B. standard as determined by the Pratt and Whitney gauge.

" 7. The appearance of fracture and material in fracture shall be recorded.

" 8. Provision shall be made for obtaining photographs of all parts after they have been subject to test, special care being taken to bring out any parts that fail.

" 9. All parts of each coupler shall be kept together after test for reference.

" DROP TEST—1. Drawbars shall receive five blows from a weight of 1,640 pounds, dropped three times from a height of ten feet and twice from a height of fifteen feet, blows to be continued from a height of fifteen feet until couplers are destroyed.

" 2. All drawbars shall receive the above blows on closed knuckles, the weight to strike a piece of steel so arranged as to distribute the force of the blow.

" 3. All couplers shall be held firmly in machine during tests, and receive one blow after another until destroyed.

" 4. A detailed record shall be kept of the effect of each blow, and also an outlined sketch of the coupler shall be marked with the location of all distortion after the fifth blow.

" PULLING TEST—1. Each company's couplers shall be divided into four pairs, and each pair pulled to destruction.

" 2. Couplers remaining uninjured in this test shall be used for knuckle single lug tests, and also drawbar tests without knuckles.

" 3. Record shall be kept of the amount of distortion at a load of 75,000 pounds, 100,000 pounds and 125,000 pounds.

" 4. Record shall be kept of the load required to pull couplers apart.

" 5. A detailed record shall be kept of each fracture and an outlined sketch shall be marked with the location of the break.

" ASSISTANCE REQUIRED.

" Laboring help as may be necessary for the handling of bars shall be provided."

The different manufacturers of couplers of the M. C.-B. type were then invited to submit four couplers to the drop tests and eight couplers to the pulling tests. A large number of manufacturers responded to the request of the committee, and sent the required number of couplers for test. The drop tests were made at Altoona and the pulling tests on the Emory machine at Watertown Arsenal.

The details of the tests were turned over to a sub-committee composed of Messrs. D. M. Perine and G. C. Bishop of the Pennsylvania Railroad Motive Power Department, who have submitted the following:

" *To the Master Car-Builders' Coupler Committee:*

" GENTLEMEN,— We submit herewith a report of the couplers we have tested, and accompanying it all the data in detail taken during the drop tests at Altoona, and the pulling tests at Watertown. You will find outline sketches (not reproduced) showing every fracture as well as photographs of all fractures (reproduced for drop tests and pulling tests), also illustrations of the drop test machine in Fig. 1 and of the manner of making all the pulling tests in Figs. 2, 3 and 4; a table, No. 1, giving a descriptive list of all couplers tested and tables giving the results of all tests in detail and summary tables of results.

"The drop test machine shown in Fig. 1, was built on a foundation of stone of 5 by 5 feet on top, and 8 by 8 feet at the bottom, and 5 feet deep. Upon this was bolted, by means of six anchor bolts, the bed plate of the machine. This was made of four round plates of boiler steel ½ inch thick, and 42 inches in diameter, riveted together with countersunk rivets.

"Two 85-pound steel rails were used for guides for the weight, and were fastened to the bed plate by means of four angle pieces, two against the bottom of the rail being bolted to the bed plate, with 4-inch studs, and to the rail with four ¾-inch bolts. The other two angle pieces were placed against the face of the rail, and were bolted to the bed plate and rail by two ¾-inch studs each. The rails were held together at the bottom by means of two plates 9 by 2 inches, with four 1-inch bolts through the web of the rail, and suitable blocks to hold them 6¾ inches apart; two keys were arranged in these pieces to hold the coupler in position under the

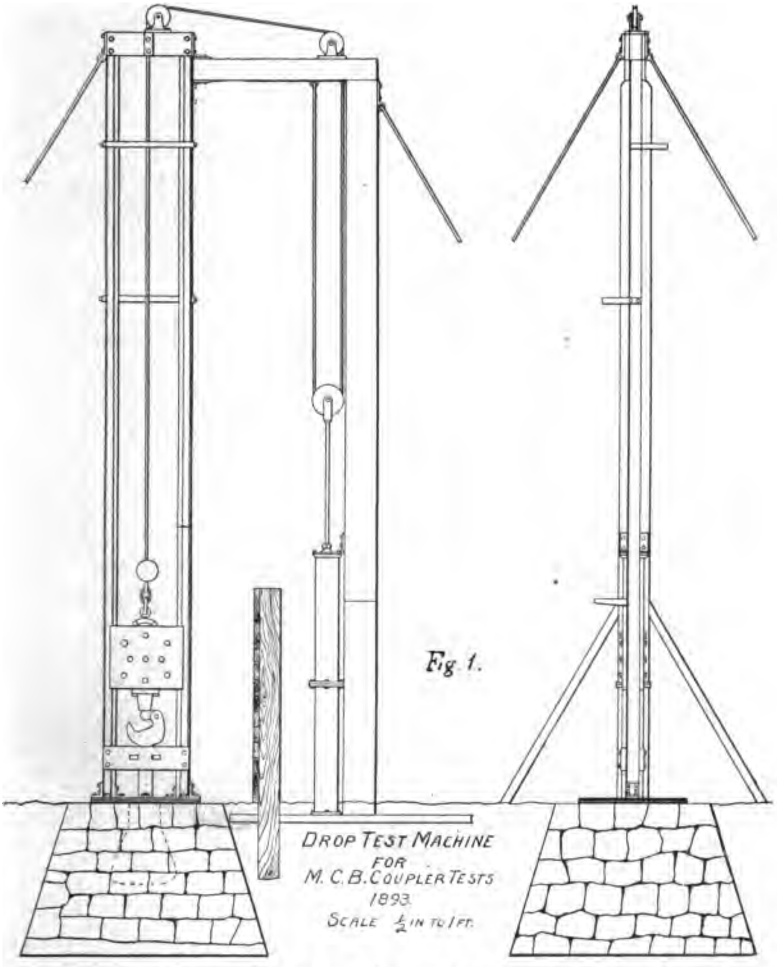


Fig. 1.

DROP TEST MACHINE
FOR
M. C. B. COUPLER TESTS
1893
SCALE ½ IN TO 1 FT.

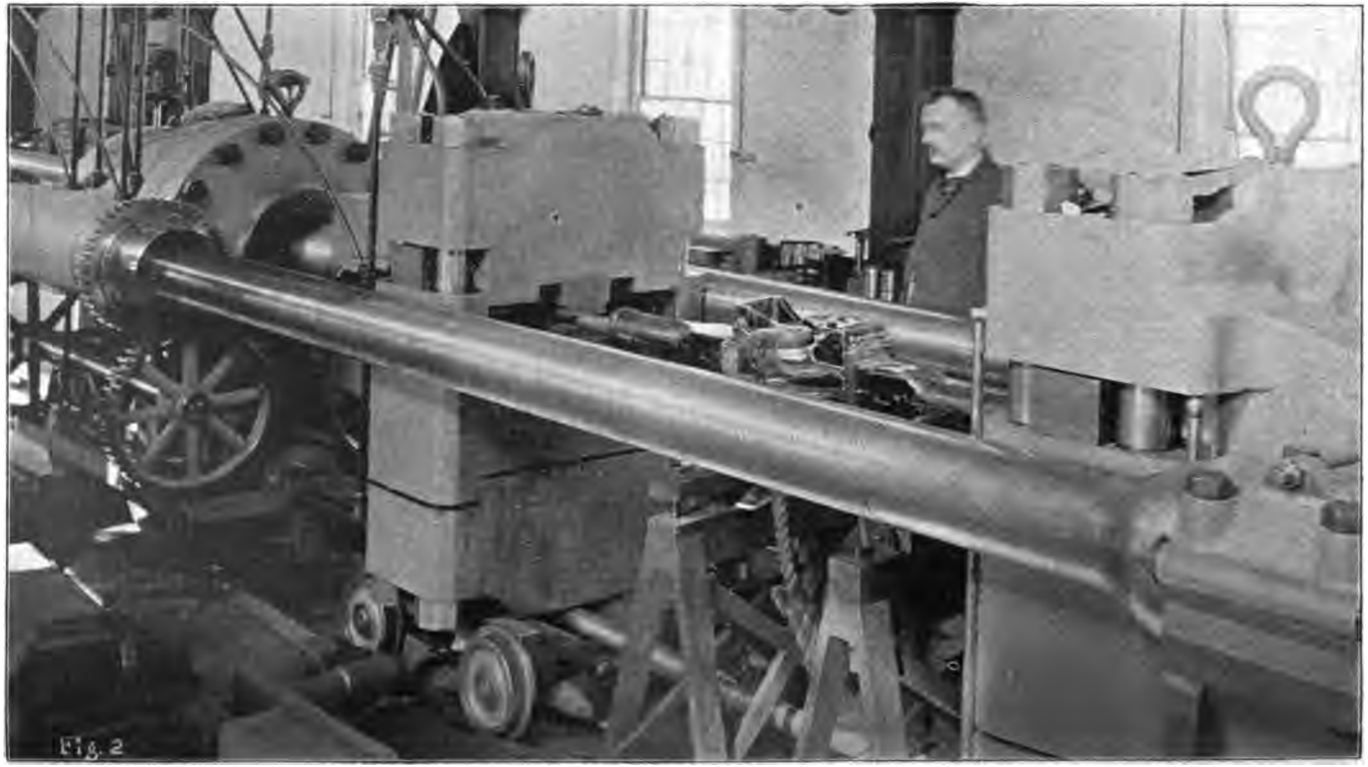


Fig. 2

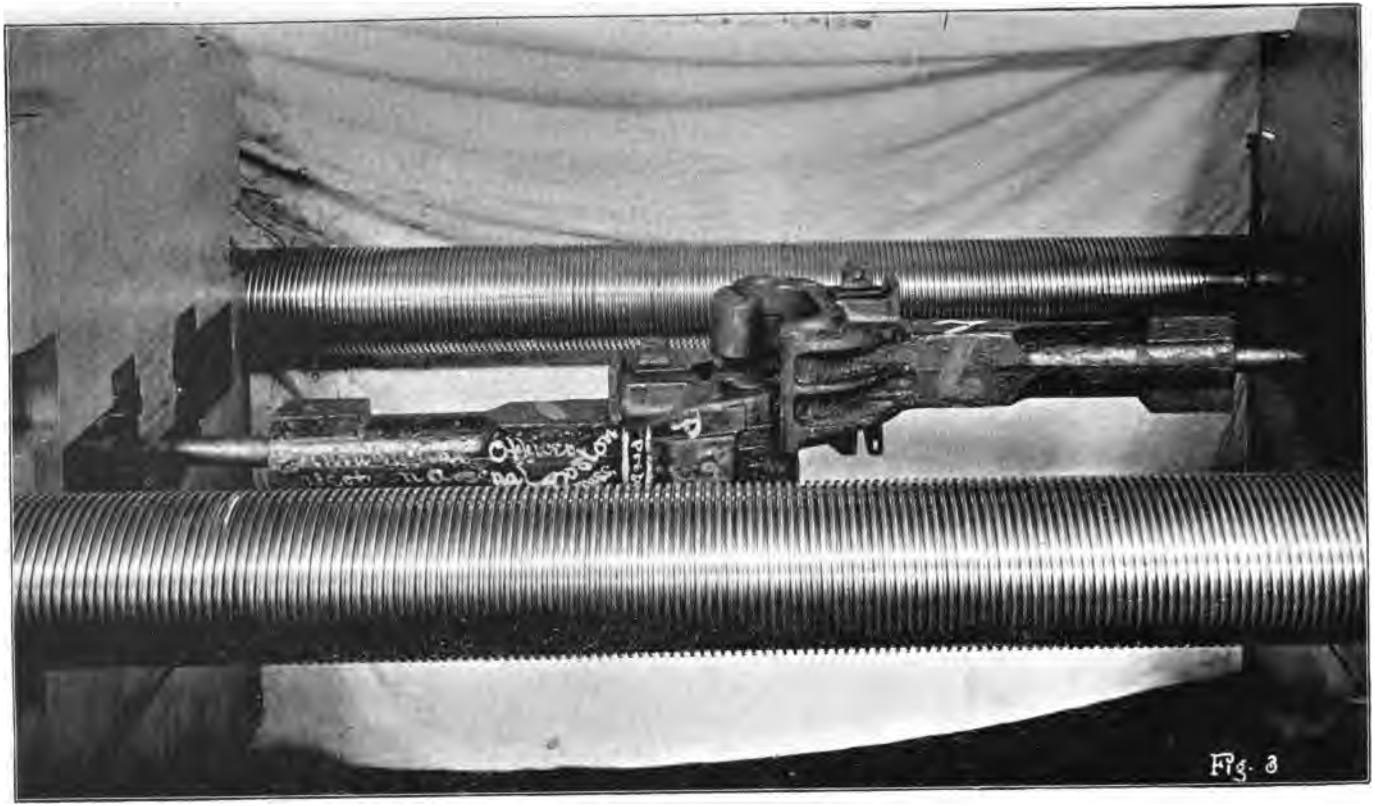


Fig. 3

weight. The rails were bolted together by two similar pieces 9 by 1½ inches at the top, and the whole was guyed by four guy rods. The weight was cast in two pieces and bolted together by nine 1¼-inch bolts. A hammer of forged steel with a face 4 by 10 inches was bolted to this by four 1¼-inch bolts, the weight complete weighing 1,640 pounds. This weight was lifted by an 8-inch air cylinder 8 feet 6 inches long, and a ½-inch steel wire rope run over the sheaves, suitably arranged to double the lift.

"An ordinary tripping hook was used to trip the weight, and the tripping irons were arranged one on each side of the machine at a height to trip the weight at 10 and 15 feet, respectively. By this arrangement it was only necessary to turn the arm of the hook toward the front of the machine to have it trip at 10 feet, and toward the back of the machine to trip it at 15 feet. The coupler was placed in the machine between the two 2 by 9 inch pieces, the shank resting on the bed plate and keyed tight by means of the two keys, and suitable liners. The shank was then held in place by means of blocks and wooden wedges. The weight was arranged to drop so that the edge of the nose was in a line with the inside edge of the pivot pin. Before testing, the coupler was weighed complete; the knuckle removed and weighed, and the parts counted. The contours were then tried by the Pratt & Whitney gauge, and the length of the shank and guard arm measured, and the construction of the guard arm noted. This guard arm measurement is the variation from guard arm length on the Pratt & Whitney gauge. The weight was allowed to rest on the knuckle, while the original and all other knuckle openings were taken. The weight was dropped on the coupler held in position, as described, three times from a height of ten feet, and from fifteen feet until the coupler was broken. After each of the first six blows the knuckle opening was measured, and the condition of the knuckle lock, pin and shank noted. The coupler was also adjusted after each one of these

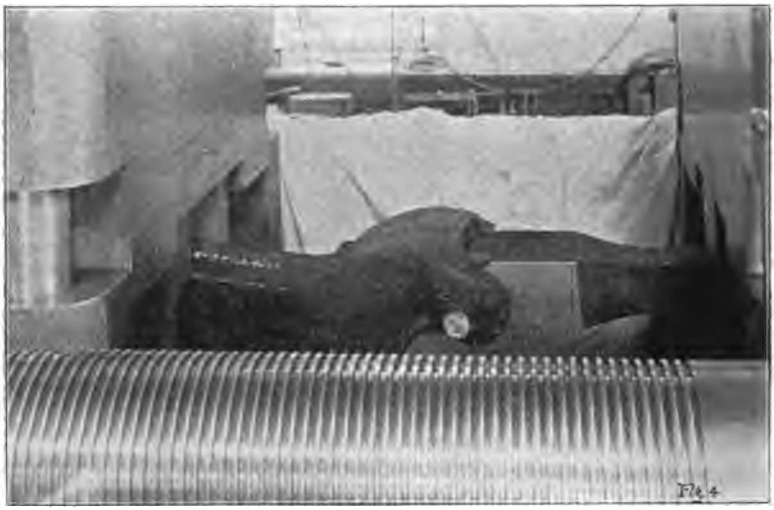


Fig. 4

blows, so that the blows were received as described. After the sixth blow the coupler was not readjusted, but the blow was taken wherever the bending of the shank permitted it. In this way many guard-arm tests were made, the shank often bending so as to permit the weight to strike between the knuckle and guard arm. When the coupler was broken the location of fracture was noted on the outline sketches, and the fracture and material described. The coupler was then photographed, care being taken to show all fractures. The record of these drop tests for each coupler is given in detail as well in the summary tables at the end. In the specifications adopted by your committee, it will be remembered that mention was made of the weight striking a piece of steel so arranged as to distribute the force of the blows. This was tried and abandoned, as it was found after the first blow when the knuckle became bent the full force of the blow could not be delivered, as the steel when struck by the weight would glance off the knuckle. This was only used for two blows on two different couplers, and did not in any way affect the test.

"The pulling tests were conducted at the United States Arsenal, Watertown, Massachusetts, on the celebrated Emory Test Machine, having a capacity of 800,000 pounds tensile load. As this machine is so well known a description will be needless, and we will therefore only state that by reason of its construction it is particularly well adapted to this kind of testing; the machine being horizontal, the jaws being large, and operated hydraulically, gives a great range of adjustment not found in the ordinary test machine with wedged jaws. See Fig. 2 showing couplers under tension in these tests. Eight couplers were required from each coupler company, and they were numbered from 1 to 8, respectively. Before the test each coupler was gauged and weighed complete, and all the knuckles were removed and weighed separately. The number of parts entering into the construction of the couplers was recorded, each washer, pin and key counting as a separate part. The bars were then divided into pairs, steel tail bolts inserted, and coupled together on the floor, Nos. 1 and 2 being coupled together, 3 and 4, etc. A rope sling was then placed around the two couplers, and by means of an overhead traveling crane, already provided in the test room, the couplers were lifted into the machine, and the steel tail bolts gripped securely. In the case of couplers having yoke blocks cast on the ends of the shanks, blocks were gripped in the jaws of the machine so as to catch the yoke blocks. This was the only deviation from the use of tail bolts during the test. After adjustment a load of two or three thousand pounds was brought to bear on the coupler, in order that they would support their own weight, and also take up all lost motion in the parts. The original openings of the knuckles were then measured. These and all other knuckle measurements were made with a steel scale in a line drawn through the link-pin hole parallel to the center line of the shank. The measurements being taken between the faces of the drawbar heads and inside faces of the knuckles. Loads of 75,000, 100,000 and 125,000 pounds were then respectively sustained for a sufficient time to obtain the measurements of the knuckle openings, and the load was then increased to destruction.

"The couplers were then removed from the machine, and an outline sketch was marked with the location of all fractures, and the knuckles were examined to see if they could be operated. The record of these tests will be found in detail for each coupler tested, and in more condensed form in summary tables at the end. The couplers which broke were then photographed, care being taken to bring out all parts that failed. After testing a set of couplers, in almost every case four uninjured bars remained, and these were used for single lug and drawbar tests in the following manner: Out of the four remaining bars, the two best pairs were picked and tail bolts being inserted, were coupled together, the upper lug of one to the lower lug of the other. The tail bolts were so adjusted in the machine that the face of the knuckles were kept parallel and the bars pulled to destruction. See Fig. 3 showing couplers under this test. Outline sketches were marked showing the location of all fractures in the single lug test, and the breaking load recorded and photographs taken. (None reproduced.) The results are shown in the record of tests. Drawbar tests, that is to say, drawbars without any knuckles, were then made as follows: The best remaining drawbars were picked out, and the knuckle, pivot pin, etc., removed. A steel tail bolt was then inserted, and a special forged steel fixture, having a shank 3 inches square by 20 inches long for gripping in the machine was coupled to the drawbar by a steel pin of high carbon, in place of the knuckle. The drawbar was then pulled to destruction (see Fig. 4), and a record was kept of the load required, also of the location of the fracture.

" Photographs were not deemed necessary in the drawbar tests, as the description of the fracture was thought to answer every purpose. This data will be found in the recorded results.

" The couplers were then removed from the machine, and an outline sketch was marked with the location of all fractures and the knuckles were examined to see if they could be operated. This data will be found in the record of the tests.

" The couplers which broke were then photographed, care being taken to bring out all parts that failed.

" After testing a set of couplers, in almost every case four uninjured bars remained.

" In the drop tests it was shown that the steel not only had the advantage of being stronger than the malleable bar, but that it also was stronger than its knuckle, which is an important advantage, as the knuckle is the easiest and least expensive part to renew. The reverse is true of the malleable bar, it being weaker than its steel knuckle, as shown by the tests. This appears from the fact that out of 75 couplers tested — 40 steel and 35 malleable — of the 40 steel couplers, 6 knuckles broke on or before the second blow at 15 feet, and but one steel drawbar was broken; and of the 35 malleable couplers no knuckles were broken on or before the second blow at 15 feet, yet 27 of the drawbars were broken.

" It was also evident that the shanks of the malleable couplers showed the most weakness, as sixty-nine per cent of the malleable bars broken broke in the shank, whereas only thirty-six per cent of the steel bars broken broke through the shank. Holes in the malleable shanks for different purposes weaken them considerably, as many of them broke through such holes. This was not noticeable in the steel bars.

" Wrought-iron pivot pins bent so as to make the knuckle inoperative after a few blows, while with steel pivot pins, and the same construction of bar lugs, they were in some cases operative after ten blows.

" In the pulling tests the importance of a pivot pin of high carbon was clearly demonstrated, it being obvious that soft steel for this use was entirely unsuitable. For example, many bars had the pivot pins sheared off at a load much below what was actually required to fracture either the bar, knuckle or lock, or else had the pin so badly bent or sheared as to make the knuckle inoperative, and the coupler in this form entirely useless for service. Again, the destruction of the bar may occur by the use of a weak pin, as was shown by a pivot pin shearing off close to one drawbar lug, and then acting as a lever would fracture the other drawbar lug.

" The single lug tests show in most cases that one lug was able to stand a load of over 90,000 pounds, and many stood over 125,000 pounds. The drawbars, that is to say, the bars with knuckles entirely removed, show themselves generally to be strong enough to stand a load of over 125,000 pounds, some standing as high a load as 200,000 pounds, and one breaking at 226,800 pounds. Very few shanks were broken, proving that they were amply strong enough to stand the yoke or tail bolt strain.

" It might be well to mention here that some comment was made by several of the representatives present at our counting the clevis, pin and key as three parts, and more than one was heard to say that 'had he known that this was to be taken as a part, and counted, he would have removed it before sending the couplers for tests.' Our reason for doing this was that we wished each part of the coupler to be recorded as it was fitted up ready for service, showing the number of parts that entered in to make up a complete coupler of each type.

" It was found that most knuckles are weak through the pivot-pin hole, and that steel pivot pins of high carbon should be used, greatly increasing the strength of the coupler. Simplicity being an important feature, it would be well to use as few parts as possible in coupler construction.

" We regret that on account of the limited time we were unable to enter into guard-arm tests as fully as we would like to have done, and feel sure that suitable tests can be devised to thoroughly test this part.

" The prescribed M. C.-B. specifications for the drop and pulling tests we do not consider in any way too severe, and would advise that they remain the same.

" A great deal of useful information concerning the construction of a drop has been gathered from this test, as we found that it was impossible to keep the foundation from giving away, and we feel sure that were we given time we could construct one that would stand all the strains without injury. Two important facts in the construction of a machine of this kind were made evident. First, that the only proper form of bed plate to use is a large casting, the larger the better, but not less than 5 by 5 feet square, containing enough metal to take up in the mass all shocks and recoil, and placed upon a steam hammer foundation. Second, that the only proper way to test a coupler is to hold it securely in the machine, while it is being tested, and allow it to receive the full force of the blow, which we do not think can be accomplished in any other way.

" The benefits derived from recent tests of this kind have already been demonstrated, as couplers that failed in the Chicago tests have been so strengthened by a change in material that they have been made thoroughly able to stand the tests conducted by the Master Car-Builders' Committee.

" We feel certain that if the Association would make application to the chief of ordnance for a drop test machine to be built at the arsenal at Watertown, there would be no trouble in accomplishing it, as this machine would not only be useful for future work of the Association, but would also be useful for a great variety of government work, it being understood that a machine of this kind was lacking at the arsenal.

" If this machine were constructed, any coupler company wishing couplers tested in future could obtain an official test by sending couplers to the arsenal, having all couplers tested on the same machine and in the same way, thus insuring comparative tests.

" We wish to thank Major J. M. Reilly, commanding officer of the arsenal at Watertown, Mr. J. E. Howard, in charge of the tests machine, and Mr. E. K. MacNutt, who made all photographs of the pulling tests, for their many favors and kindnesses shown not only to ourselves, but to the many coupler representatives present.

" Respectfully,

" D. M. Perine,
" G. C. Bishop."

Your committee has not taken the time to thoroughly digest this very interesting report from Messrs. Perine and Bishop, or to draw conclusions from it. We desire, however, to call the attention of the Association to the fact that so much has been accomplished by coupler manufacturers since the proposed specifications were formulated, and that so much improvement has been brought about in couplers since the beginning of the tests, so that even if we were ready to report definite specifications for the adoption of the M. C.-B. A., we would not consider it wise to do so at present. It must, however, be evident that the proposed specifications are in no way too severe, a matter which has been questioned by a good many.

It is also gratifying to know that the character of the test will admit of two kinds of material in the bars. The importance of this cannot be overestimated. Fewer openings and holes in the shanks of the malleable bars will materially aid them in meeting drop tests. Your committee has not been able to carry to a conclusion the guard-arm test, nor has it taken any action on the increased dimension of the shank which was brought up last year. It is believed that a very decided step has been inaugurated in the matter of M. C.-B. coupler investigations. What results will eventually be brought out it is difficult to foretell. That it will enable our managers and coupler manufacturers to better distinguish between good and bad bars we believe no one will dispute.

In conclusion, then, the committee submits the foregoing as a preliminary report and requests to be continued for another year, when it is hoped sufficient data will be at hand for a final report.

J. M. WALLIS,
R. D. WADE,
G. W. RHODES,
J. H. McCONNELL,
JNO. S. LENTZ,
T. G. DUNCAN,
Committee.

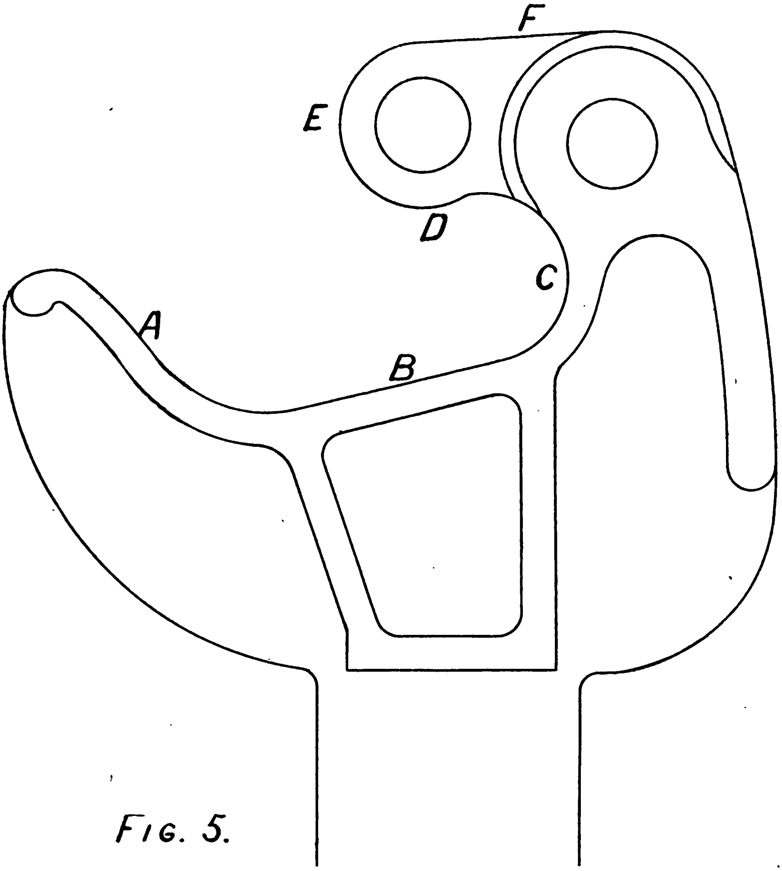


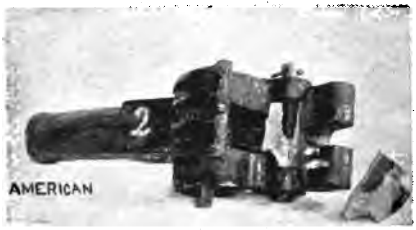
FIG. 5.

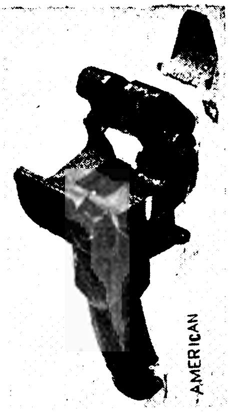
DESCRIPTIVE LIST OF COUPLERS TESTED.

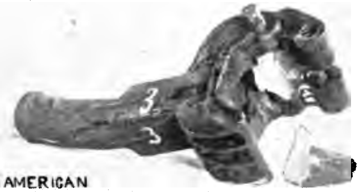
Name of Coupler.	Name of Manufacturer.	Material in			Size of Pivot Pin.	Total Number of Parts.	No. of Couplers		Length of Shank.	Whether fitted for		Shank.		Outside face of guard arm.
		Coupler Body.	Knuckle.	Pivot Pin.			Gauged	O.K. by Gauge.		2-in. Tail bolt or Yoke.	Amer. Con. Draw-bar.	Section through middle.	Size behind head.	
					in.								in.	
American......	Solid Steel Co........	O. H. Steel	O. H. Steel	Steel .	1½	10	12	4	21¼	Tail bolt....... .	No...	Round	5 x 5	4 Ribs.
Brown's E Link	"	"	"	"	1½	13	12	0	"	" and yoke.	"	"	"	5 "
Buckeye	Buckeye Automatic Car Coupler Co.....	Mall. Iron	"	"	1½	8	12	5	"	Tail bolt..........	"	"	"	Plain.
California	Solid Steel Co........	O. H. Steel	"	"	1½	7	12	0	"	" and yoke.	"	"	4¾ x 4¾	"
Chicago	Chicago Tire and Spring Co	"	"	"	1½	7	4	2	"	Yoke	"	Square	5¼ x 5¼	2 Ribs.
Drexel.........	Solid Steel Co........	"	"	"	1½	7	12	5	21⅜	Tail bolt and yoke	"	Round	4¾ x 4¾	3 "
Empire	Isaac Johnson & Co..	Mall. Iron	"	W. Iron	1½	8	4	4	....	" "	"	"	5 x 5	Plain.
Gould	Erie Mall. Iron Co...	"	"	Steel .	1⅝	9	4	0	21	" "	"	"	"	4 Ribs.
Hinson	Natl. Mall. Cstg. Co*.	"	"	"	1⅜	8	12	9	21½	Tail bolt..........	Yes...	"	"	3 "
Janney	McConway, Torley & Co	"	W. Iron ..	"	1⅜	10	12	4	21¼	"	No....	"	"	3 "
Johnson	....	"	O. H. Steel	"	1½	11	12	3	21⅜	"	Yes...	"	"	3 "
Ludlow........	Springfield Mall. Iron Co	"	Mall. Iron	M. Iron	2½‡	12	8	0	....	"	No....	"	"	....
National †.....	Solid Steel Co........	O. H. Steel	O. H. Steel	Steel .	1½	10	12	1	21¼	Tail bolt and yoke	"	"	4¾ x 5	3 "
Rivers.........	....	"	"	"	1½	4	12	0	21½	Neither	"	Open Shank	5 x 5½	4 "
Standard	Troy Mall. Iron Co...	Mall. Iron	Pressed St'l	None .	......	4	12	1	21¼	Tail bolt....	Yes...	Round	5¼ x 5¼	Plain.
St. Louis	Shickle, Harrison & Howard	O. H. Steel	O. H. Steel	Steel .	1¼	6	4	0	21⅛	"	" ...	"	5 x 5	2 Ribs.
Thurmond	Isaac Johnson & Co ..	Mall. Iron	"	"	1½	8	4	0	21½	"	No....	"	"	3 "
Trojan	Trojan Car Coupler Co	"	"	"	1⅜	7	12	5	21¼	"	Yes...	"	"	3 "
United States .	Solid Steel Co.......	O. H. Steel	"	"	1½	5	12	2	21⅜	"	No....	"	"	3 "
Williams	Shickle, Harrison & Howard	Basic Steel	Basic Steel	"	1⅜	12	4	0	21¼	Tail bolt and yoke	Yes...	"	"	3 "

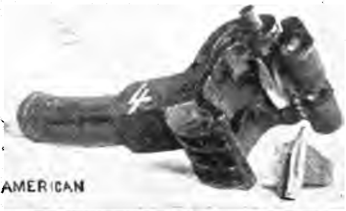
* Nos. 1 and 2 in drop test made by Southern Malleable Iron Co. † Formerly called "Perfected." ‡ Hollow 1⅝ in.

AMERICAN DROP TESTS

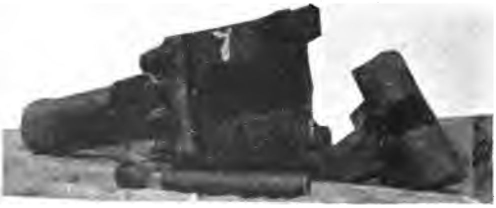


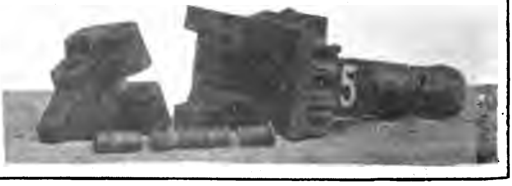






AMERICAN PULLING TESTS





AMERICAN COUPLER TESTS.

COUPLER BODY, O. H. STEEL. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-INCH.
Total number of parts, 10.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		228½	229½	223	228
“ “ Knuckle		52½	52½	52½	52
Does it pass M. C.-B. Limit Gauge?		Yes.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	......	......	......
	B	+$\frac{1}{16}$	......	......	......
	C	......	......	+$\frac{1}{16}$	+⅛
	D	......	......	......	......
	E	+$\frac{1}{16}$	+⅛	+$\frac{3}{16}$	+⅛
	F	+¼	+¼	+¼	+¼
Knuckle opening before test		3$\frac{3}{16}$	3⅛	3¼	3⅛
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	......	......	......	......
	Knuckle opening	2$\frac{15}{16}$	2⅞	3	2$\frac{15}{16}$
	2d blow, 10 ft	P. and S. bent.	P. and S. bent.	S. bent.	S. bent.
	Knuckle opening	2⅞	2$\frac{13}{16}$	2$\frac{15}{16}$	2⅞
	3d blow, 10 ft	P. and S. bent.	P. and S. bent.	S. bent.	K. opens ½ in. P. and S. bent.
	Knuckle opening	2⅞	2¾	2$\frac{15}{16}$	2$\frac{13}{16}$
	4th blow, 15 ft	P. and S. bent.	P. and S. bent.	K. opens ½ in. P. and S. bent.	K. opens ½ in. P. and S. bent.
	Knuckle opening	2¾	2⅝	2$\frac{13}{16}$	2¾
	5th blow, 15 ft	P. and S. bent.	K. tight. P. and S. bent.	K. opens ½ in. P. and S. bent.	P. and S. bent.
	Knuckle opening	2$\frac{11}{16}$	2½	2¾	2⅝
	6th blow, 15 ft	P. and S. bent.	K. tight. P. and S. bent.	K. opens ¼ in. P. and S. bent.	P. and S. bent.
	Knuckle opening	2⅝	2½	2$\frac{11}{16}$	2$\frac{7}{16}$
Additional blows at 15 ft		9	4	9	4
Total blows required to break		15	10	15	10

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		215¾	225½	227¼	224¾	227	225½	227¾	225½
“ “ Knuckle		52	52½	52	51¾	52½	51¾	52½	53
Does it pass M. C.-B. Limit Gauge?		Yes.	No.	No.	No.	Yes.	No.	No.	Yes.
Knuckle Opening	Original	3⅜	3$\frac{5}{16}$	3$\frac{5}{16}$	3$\frac{5}{16}$	3$\frac{5}{16}$	3$\frac{5}{16}$	3⅜	3¼
	After 75,000 lbs.	3½	3$\frac{9}{16}$	3½	3½	3$\frac{7}{16}$	3½	3$\frac{9}{16}$	3$\frac{7}{16}$
	“ 100,000 “	3$\frac{9}{16}$	3⅝	3⅝	3⅝	3$\frac{9}{16}$	3$\frac{9}{16}$	3$\frac{11}{16}$	3$\frac{9}{16}$
	“ 125,000 “	3¾	3$\frac{13}{16}$	3$\frac{13}{16}$	3$\frac{13}{16}$	3¾	3$\frac{13}{16}$	3$\frac{13}{16}$	3⅝
Pull required to break		....	146,300	157,400	....	156,800	....	153,300	....

REMARKS.

Knuckle pulled out in Nos. 3, 5 and 7, and knuckle would not open after test in Nos. 2 and 8.

Pivot pin sheared off in Nos. 3, 5 and 7, and was partly sheared or bent in all other cases.

SINGLE LUG TEST.—Pivot pin bent and knuckles slipped past without fracture at 135,000 lbs.

DRAWBAR TEST.—Broke upper lug of drawbar and started a crack behind the head at 219,900 lbs.

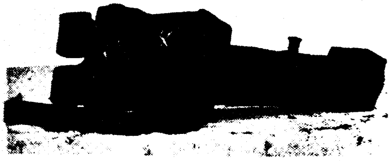
BROWN'S E. LINK
DROP TESTS

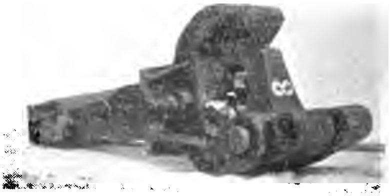
BROWNS EMERGENCY LINK

BROWNS EMERGENCY LINK

BROWNS EMERGENCY LINK

BROWN'S E. LINK
PULLING TESTS





BROWN'S EMERGENCY LINK COUPLER TESTS.

COUPLER BODY, O. H. STEEL. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-INCH.
Total number of parts, 13.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		233½	234	231½	229
" " Knuckle		36	36½	36	36
Does it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	$+\frac{1}{16}$	$+\frac{1}{16}$	......
	B	......	......	......	......
	C	+⅛	+⅛	+⅛	+⅛
	D	......	......	$+\frac{1}{16}$	+⅛
	E	+¼	+¼	+¼	+¼
	F	$+\frac{5}{16}$	$+\frac{5}{16}$	$+\frac{5}{16}$	+⅛
Knuckle opening before test		3¼	3¼	$3\frac{5}{16}$	$3\frac{5}{16}$
Defects of Couplers after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft.	K. and L. tight, P. bent.	K. and L. tight, P. bent.	K. tight, P. bent.	K. and L. tight, P. bent.
	Knuckle opening.	3	2⅞	$2\frac{15}{16}$	$2\frac{15}{16}$
	2d blow, 10 ft	K. and L. tight, P. bent.	K. and L. tight, P. bent.	K. tight, P. bent.	K. and L. tight, P. bent.
	Knuckle opening.	2⅞	$2\frac{13}{16}$	$2\frac{13}{16}$	$2\frac{13}{16}$
	3d blow, 10 ft	K. and L. tight, P. bent.	K. and L. tight, P. bent.	K. and L. tight, P. and S. bent.	K. and L. tight, P. bent.
	Knuckle opening.	$2\frac{13}{16}$	$2\frac{11}{16}$	$2\frac{11}{16}$	2¾
	4th blow, 15 ft.	K. and L. tight, P. and S. bent.	K. and L. tight, P. bent.	K. and L. tight, P. and S. bent.	Knuckle broke.
	Knuckle opening.	$2\frac{9}{16}$	2⅝	$2\frac{9}{16}$	......
	5th blow, 15 ft.	K. and L. tight, P. and S. bent.	K. and L. tight, P. and S. bent.	K. and L. tight, P. and S. bent.	......
	Knuckle opening.	2½	$2\frac{9}{16}$	$2\frac{7}{16}$	......
	6th blow, 15 ft.	Lower lug of knuckle broke.	Lower lug of knuckle broke.	K. and L. tight, P. and S. bent.	......
	Knuckle opening.	......	......	$2\frac{5}{16}$	......
Additional blows at 15 ft.		......	......	1	......
Total blows required to break		6	6	7	4

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		231¼	231¾	230½	227½	224½	226¾	231	232½
" " Knuckle		37¼	36¼	36½	36½	37½	36¼	37	36¾
Does it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.	No.	No.	No.	No.
Knuckle Opening	Original	3⅜	3⅜	3⅜	$3\frac{5}{16}$	$3\frac{5}{16}$	$3\frac{7}{16}$	3⅜	3½
	After 75,000 lbs.	3⅝	$3\frac{9}{16}$	$3\frac{11}{16}$	$3\frac{9}{16}$	$3\frac{9}{16}$	3⅝	3⅝	$3\frac{13}{16}$
	" 100,000 "	3¾	$3\frac{11}{16}$	$3\frac{13}{16}$	$3\frac{11}{16}$	3⅝	$3\frac{11}{16}$	$3\frac{11}{16}$	3⅞
	" 125,000 "	4	$3\frac{11}{16}$	$4\frac{1}{16}$	$3\frac{15}{16}$	$3\frac{13}{16}$	3⅞	3⅞	4
Pull required to break		147,720	....	....	133,900	....	149,200	....	145,300

REMARKS.

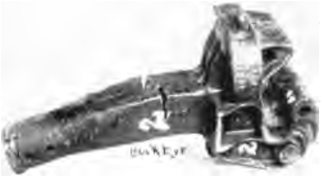
Knuckle was broken in Nos. 4 and 6, and it would not open after test in any case.

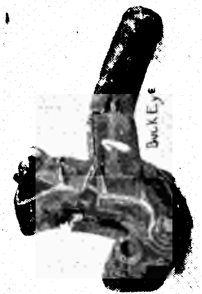
Pivot pin bent or partly sheared in every case.

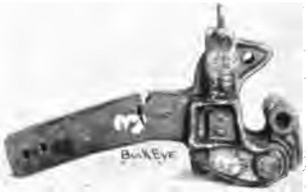
SINGLE LUG TEST.—Lower lug of No. 5 broke at 99,500 lbs.

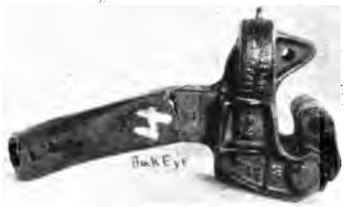
DRAWBAR TEST.—Broke lower lug of drawbar through pivot pin hole at 139,900 lbs.

BUCKEYE DROP TESTS

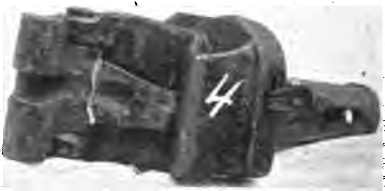


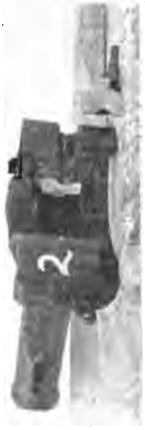


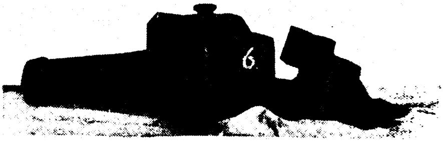


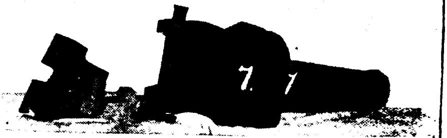


BUCKEYE PULLING TESTS









BUCKEYE COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, O. H. STEEL. STEEL PIVOT PIN, 1 1/2-INCH.
Total number of parts, 8.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		232	231 1/2	229	226 1/2
" " Knuckle		57 1/2	55 1/2	56 1/2	55 1/2
Does it pass M. C.-B. Limit Gauge ?		Yes.	Yes.	Yes.	Yes.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	+ 1/16	......	......
	B	+ 1/16	+ 1/16	......	......
	C	......	......	......	......
	D	......	......	......	......
	E	+ 1/16	+ 1/16	......	......
	F	+ 3/16	+ 1/8	+ 1/8	+ 1/8
Knuckle opening before test		3 1/4	3 3/16	3 1/4	3 1/4
Defects of Coupler after B.—After each ow the Knuckle—K, Pin—P, Shank—S, Lock—L, ere examined for efects.	1st blow, 10 ft	S. started & upset	S. started.	......	......
	Knuckle opening	3	3 1/16	3 1/8	3 1/16
	2d blow, 10 ft	S. bent and upset	S. bent.	......	......
	Knuckle opening	2 13/16	2 15/16	2 15/16	2 15/16
	3d blow, 10 ft	S. bent and upset	S. bent.	......	S. started.
	Knuckle opening	2 5/8	2 3/4	2 7/8	2 13/16
	4th blow, 15 ft	S. bent and upset	Shank broke.	S. bent.	S. bent.
	Knuckle opening	2 1/2	......	2 5/8	2 5/8
	5th blow, 15 ft	S. bent and upset	......	Shank broke.	S. bent and upset
	Knuckle opening	2 1/4	......	......	2 3/8
	6th blow, 15 ft	S. cracked.	......	......	S. cracked.
	Knuckle opening	2 7/16	......	......	2 3/16
Additional blows at 15 ft		4	0	0	2
Total blows required to break		10	4	5	8

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		222 1/2	227 1/2	222 3/4	226 1/2	228 1/2	222 1/2	224 1/4	221 3/4
" " Knuckle		58	57 3/4	58 1/2	59	58 1/4	57 1/4	58	57 3/4
Does it pass M. C.-B. Limit Gauge?		Yes.	Yes.	No.	Yes.	No.	No.	Yes.	Yes.
Knuckle Opening	Original	3 3/8	3 5/16	3 5/16	3 5/16	3 3/8	3 1/4	3 5/16	3 3/8
	After 75,000 lbs	3 9/16	3 1/2	3 1/2	3 7/16	3 9/16	3 7/16	3 9/16	3 1/2
	" 100,000 "	3 11/16	3 9/16	3 1/2	3 9/16	3 5/8	3 9/16	3 11/16	3 11/16
	" 125,000 "	3 13/16	3 3/4	3 13/16	3 3/4	3 7/8	3 3/4	3 13/16	3 15/16
Pull required to break		....	163,180	....	139,000	....	147,000	169,100	....

REMARKS.

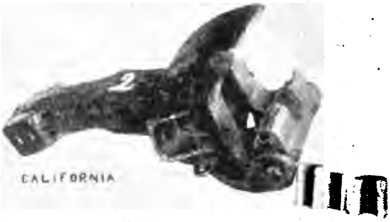
Knuckle broke in Nos. 2, 4, 6 and 7. Knuckle opened all right in all other cases.

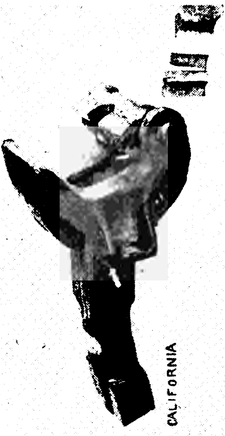
Pivot pin slightly bent in all cases except No. 4.

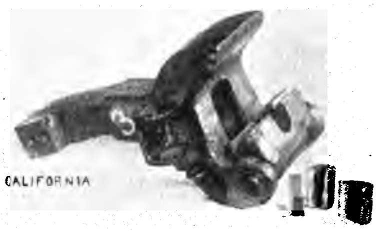
SINGLE LUG TEST.—Broke lower lug of No. 3 at 133,200 lbs.

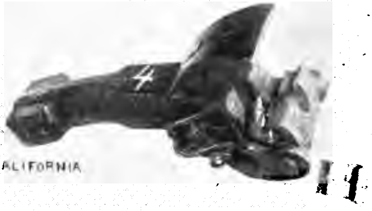
DRAWBAR TEST.—Broke upper drawbar lug at 125,800 lbs.

CALIFORNIA DROP TESTS

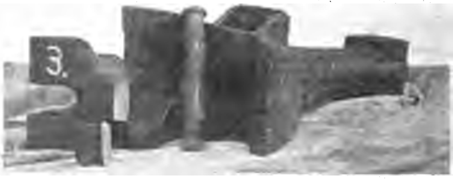


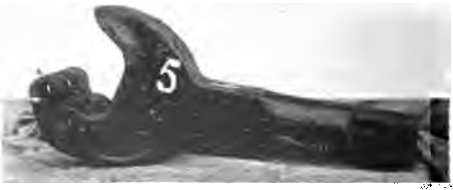






CALIFORNIA PULLING TESTS





CALIFORNIA COUPLER TESTS.

COUPLER BODY, O. H. STEEL. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, $1\frac{1}{2}$ INCH.
Total number of parts, 7.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		227	$216\frac{1}{2}$	221	$236\frac{1}{2}$
" " Knuckle		33	34	$34\frac{1}{2}$	34
Does it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	$+\frac{1}{16}$	......	$+\frac{1}{16}$
	B	......	......	......	......
	C	$+\frac{1}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$	......
	D	......	$+\frac{1}{16}$	$+\frac{1}{16}$	......
	E	$+\frac{1}{8}$	$+\frac{1}{16}$	$+\frac{1}{8}$	......
	F	$+\frac{3}{16}$	$+\frac{1}{8}$	$+\frac{1}{8}$	$+\frac{1}{8}$
Knuckle opening before test		$3\frac{1}{8}$	$3\frac{1}{8}$	$3\frac{3}{16}$	$3\frac{1}{8}$
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	K. tight, P. bent.	K. and L. tight, P. bent.	K. tight, P. bent.	K. tight, P. bent.
	Knuckle opening	$2\frac{11}{16}$	$2\frac{11}{16}$	$2\frac{13}{16}$	$2\frac{13}{16}$
	2d blow, 10 ft	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. bent.
	Knuckle opening	$2\frac{9}{16}$	$2\frac{1}{2}$	$2\frac{11}{16}$	$2\frac{11}{16}$
	3d blow, 10 ft	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening	$2\frac{3}{8}$	$2\frac{3}{8}$	$2\frac{9}{16}$	$2\frac{1}{2}$
	4th blow, 15 ft	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening	$2\frac{1}{4}$	$2\frac{3}{16}$	$2\frac{3}{8}$	$2\frac{1}{4}$
	5th blow, 15 ft	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening	$2\frac{1}{16}$	2	$2\frac{3}{16}$	$2\frac{1}{8}$
	6th blow, 15 ft	K. tight, P. and S. bent.	K. tight, P. and S. bent, L. opens $\frac{3}{4}$ in.	K. and L. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening	$1\frac{7}{8}$	$1\frac{13}{16}$	$2\frac{1}{8}$	2
Additional blows at 15 ft		7	5	7	7
Total blows required to break		13	11	13	13

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No 8.
Weight of Coupler complete		222	$224\frac{1}{2}$	$223\frac{1}{2}$	$221\frac{1}{2}$	$215\frac{1}{2}$	$226\frac{1}{2}$	220	$235\frac{1}{2}$
" " Knuckle		$34\frac{3}{4}$	$35\frac{3}{4}$	$35\frac{1}{4}$	35	$35\frac{3}{4}$	$35\frac{3}{4}$	$35\frac{1}{2}$	$35\frac{1}{2}$
Does it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.	No.	No.	No.	No.
Knuckle Opening	Original	$3\frac{1}{4}$	$3\frac{3}{16}$	$3\frac{1}{8}$	$3\frac{3}{16}$	$3\frac{7}{16}$	$3\frac{3}{8}$	$3\frac{1}{4}$	$3\frac{1}{4}$
	After 75,000 lbs	$3\frac{9}{16}$	$3\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{9}{16}$	$3\frac{3}{4}$	$3\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$
	" 100,000 "	$3\frac{13}{16}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{2}$	$4\frac{3}{8}$	$3\frac{13}{16}$	$3\frac{13}{16}$
	" 125,000 "	5	$4\frac{15}{16}$	....	....	....	....	$4\frac{3}{8}$	$4\frac{3}{8}$
Pull required to break		....	126,800	117,100	....	....	119,900	....	130,100

REMARKS.

Knuckle was broken after test in No. 3, and knuckle would not open in any case.

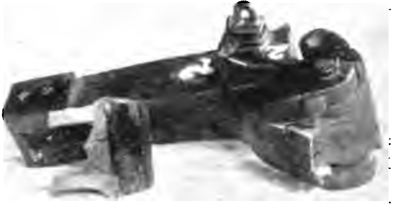
Pivot pin was bent in all cases.

SINGLE LUG TEST.—Couplers separated at 70,000 lbs. by bending the knuckle tongue backward.

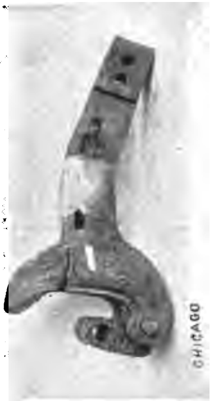
DRAWBAR TEST.—Broke lower drawbar lug through pivot pin hole at 139,900 lbs.

CHICAGO

DROP TESTS



CHICAGO



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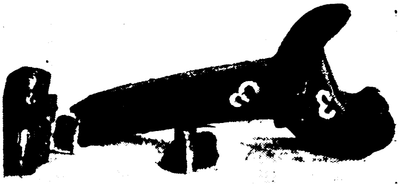

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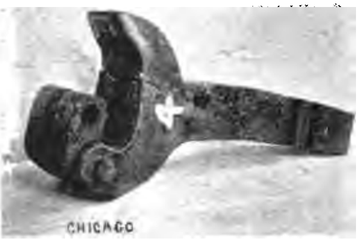
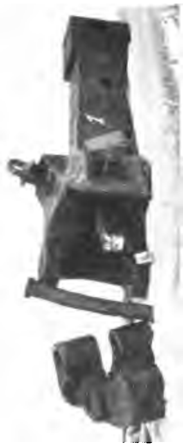
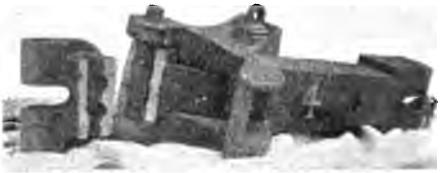
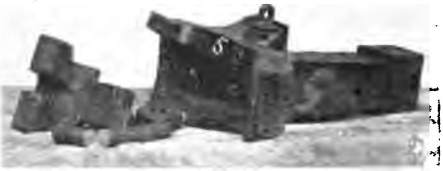


CHICAGO

CHICAGO PULLING TESTS







CHICAGO COUPLER TESTS.

COUPLER BODY, O. H. STEEL. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-INCH.
Total number of parts, 7.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		221½	221½	220	223
" " Knuckle		53	53	53½	53½
Does it pass M. C.-B. Limit Gauge?		No.	No.	Yes.	Yes.
Variations from Standard Contour Lines at (See Fig. 5.)	A	......	$-\frac{1}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$
	B	$+\frac{1}{16}$	$+\frac{3}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$
	C	$+\frac{3}{16}$	$+\frac{1}{16}$	+ ⅛	$+\frac{1}{16}$
	D	$-\frac{1}{16}$	......	......	......
	E	$+\frac{1}{16}$	......	......	$+\frac{1}{16}$
	F	$+\frac{3}{16}$	$+\frac{5}{16}$	$+\frac{3}{16}$	+ ¼
Knuckle opening before test		3⅛	$3\frac{3}{16}$	3⅛	$3\frac{3}{16}$
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 f	......	......	......	......
	Knuckle opening	2⅝	$3\frac{1}{16}$	$2\frac{15}{16}$	3
	2d blow, 10 ft	......	......	S. bent.	......
	Knuckle opening	2½	$2\frac{5}{16}$	2⅞	$2\frac{15}{16}$
	3d blow, 10 ft	......	K. opens ¾ in P. and S. bent.	S. bent.	......
	Knuckle opening	$2\frac{5}{16}$	2⅞	$2\frac{13}{16}$	2⅞
	4th blow, 15 ft	......	K. tight, P. and S. bent.	P. and S. bent.	P. bent.
	Knuckle opening	$2\frac{9}{16}$	2¾	2⅝	$2\frac{11}{16}$
	5th blow, 15 ft	S. bent.	K. tight, P. and S. bent.	K. opens ½ in. P. and S. bent.	P. and S. bent.
	Knuckle opening	2¼	2⅝	2½	$2\frac{9}{16}$
	6th blow, 15 ft	K. tight, S. bent.	K. tight, P. and S. bent.	K. opens ¾ in. P. and S. bent.	P. and S. bent.
	Knuckle opening	$2\frac{3}{16}$	2½	$2\frac{7}{16}$	$2\frac{9}{16}$
Additional blows at 15 ft		15	14	6	9
Total blows required to break		21	20	12	15

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		222	216	220	217½	219½	222¼	218	217½
" " Knuckle		53¾	54¼	53½	53½	53¼	53¼	53½	51¼
Does it pass M. C.-B. Limit Gauge?		Not	tested.						
Knuckle Opening.	Original	$3\frac{5}{16}$	3¼	3½	3½	$3\frac{5}{16}$	3⅜	$3\frac{5}{16}$	3¼
	After 75,000 lbs.	3½	3⅜	$3\frac{9}{16}$	$3\frac{9}{16}$	3⅜	3½	$3\frac{7}{16}$	$3\frac{7}{16}$
	" 100,000 "	$3\frac{9}{16}$	$3\frac{7}{16}$	$3\frac{11}{16}$	3⅝	3½	$3\frac{9}{16}$	3½	$3\frac{9}{16}$
	" 125,000 "	3⅝	3½	3¾	$3\frac{11}{16}$	$3\frac{9}{16}$	$3\frac{9}{16}$	$3\frac{9}{16}$	$3\frac{9}{16}$
Pull required to break		195,200	....	....	169,700	185,600	....	171,100	....

REMARKS.

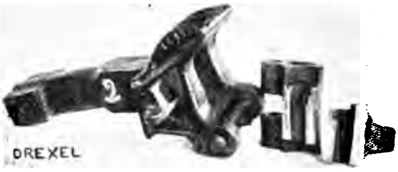
Knuckle broke in Nos. 4 and 7. Knuckle would not open after tests in Nos. 1, 2, 3, 6 and 8.

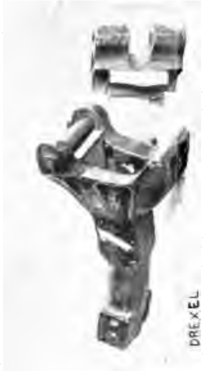
Pivot pin broke in No. 5, and was bent in all other cases.

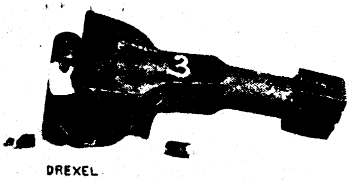
SINGLE LUG TEST.—End of locking arm of No. 2 sheared off at 154,600 lbs.

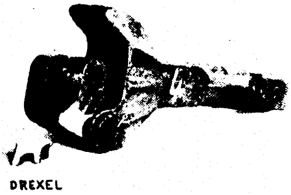
DRAWBAR TEST.—Broke upper drawbar lug through pivot pin hole at 209,500 lbs.

DREXEL
DROP TESTS

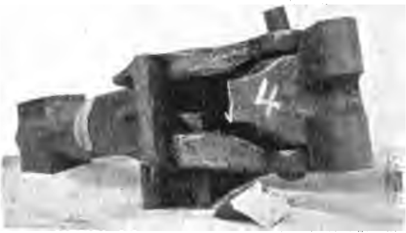


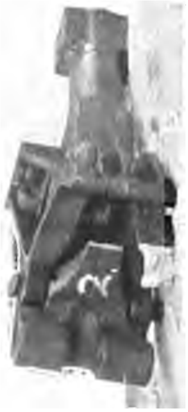


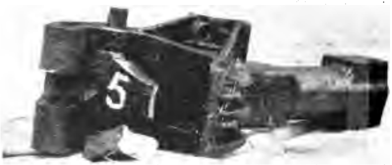


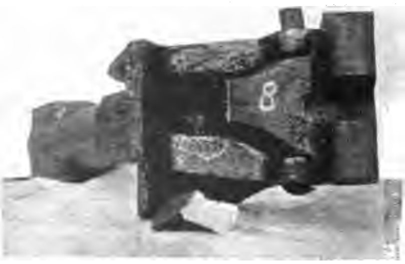


DREXEL
PULLING TESTS









DREXEL COUPLER TESTS.

COUPLER BODY, O. H. STEEL. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-INCH.
Total number of parts, 7.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
eight of Coupler complete........		207½	206	203	206½
" " Knuckle		58	58	57	58
oes it pass M. C.-B. Limit Gauge?.		Yes.	No.	Yes.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A ..	......	......	......	......
	B ..	......	......	......	......
	C .	+ 1/16	+ 1/16	+ ⅛	+ 1/16
	D ..	......	+ 1/16	+ 1/16	+ 1/16
	E ..	+ 1/16	+ 1/16	+ 3/32	+ 1/32
	F ..	......	+ ⅛	+ ⅛	+ ⅛
nuckle opening before test........		3 3/16	3¼	3 3/16	3 3/16
Defects of Coupler after . B.—After each ow the Knuckle—K, Pin—P, Shank—S, Lock—L, re examined for fects.	1st blow, 10 ft ...	......	P. bent.	P. bent.	......
	Knuckle opening.	2 15/16	3	2⅞	3
	2d blow, 10 ft ...	......	P. bent.	K. tight, P. bent.	P. bent.
	Knuckle opening.	2⅞	2 15/16	2 13/16	2⅞
	3d blow, 10 ft ...	......	P. bent.	K. tight, P. and S. bent.	P. bent.
	Knuckle opening.	2 13/16	2⅞	2¾	2 13/16
	4th blow, 15 ft...	P. and S. bent.	K. opens ¼ in. P. and S. bent.	K. tight, P. and S. bent.	K. cracked, P. and S. bent.
	Knuckle opening.	2¾	2 13/16	2⅝	2¾
	5th blow, 15 ft...	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening.	2⅝	2 11/16	2 9/16	2⅝
	6th blow, 15 ft...	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. Piece broken out, P. and S. bent.	Knuckle broke.
	Knuckle opening.	2 9/16	2 9/16	2½	......
dditional blows at 15 ft...........		4	1	4	......
otal blows required to break		10	7	10	6

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
eight of Coupler complete......		199	201	207¾	198¼	201½	202	200½	200¾
" " Knuckle		58½	56¼	58¼	57¾	58½	59¼	57¼	57½
oes it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.	Yes.	Yes.	Yes.	No.
nuckle Opening	Original...........	3¼	3 3/16	3¼	3 5/16	3 5/16	3¼	3¼	3⅜
	After 75,000 lbs...	3⅜	3 5/16	3½	3⅝	3½	3 7/16	3 7/16	3 9/16
	" 100.000 " ...	3½	3 7/16	3 11/16	3¾	3⅝	3⅝	3 9/16	3¾
	" 125,000 " ...	3 11/16	3 11/16	3 15/16	4	3 15/16	3⅞	3 13/16	3 15/16
ll required to break		....	161,600	....	147,900	146,000	....	....	153,700

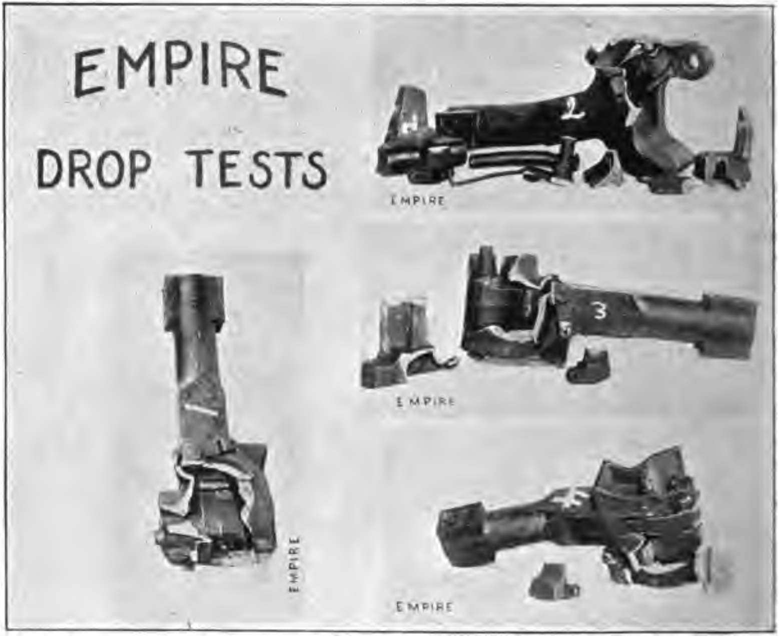
REMARKS.

Knuckle was broken after test in Nos. 2, 5 and 8, and knuckle would not open in Nos 3, 4 and 6.

Pivot pin was bent in every case.

SINGLE LUG TEST.—Broke upper lug of No. 3 at load of 120,500 lbs.

DRAWBAR TEST.—Broke special steel attachment and sheared pin, drawbar lugs bent outward to an angle of 25°, but not broken at 214,100 lbs.


EMPIRE
DROP TESTS
4
2
EMPIRE
3
EMPIRE
EMPIRE
EMPIRE

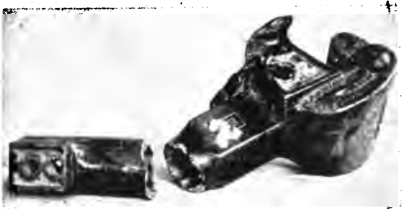
EMPIRE COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, O. H. STEEL. PIVOT PIN, WRT. IRON, 1½ IN.

Total number of parts, 8.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
eight of Coupler complete........		203½	203	201½	204
" " Knuckle		35½	36	36½	36½
oes it pass M. C.-B. Limit Gauge? .		Yes.	Yes.	Yes.	Yes.
Variation from Standard Contour Lines at (See Fig. 5.)	A ..	......	+1/16	+1/16	+1/16
	B ..	......	......	......	......
	C ..	+⅛	+⅛	+⅛	+⅛
	D ..	.....	......	......	......
	E ..	......	+⅛	+[illegible]	......
	F ..	+3/16	+[illegible]	+¼	+1/16
nuckle opening before test........		3 1/16	3 3/16	3 [illegible]	3 1/16
Defects of Coupler after	1st blow, 10 ft ...	K. opens ½ in. P. bent.	K. opens ¼ in. P. bent.	K. opens ¼ in. P. and S. bent.	K. opens ¼ in. P. and S. bent.
	Knuckle opening.	2¾	2[illegible]	2¾	2⅝
	2d blow, 10 ft ...	K. tight, P. and S. bent, Head cracked.	K. opens ¼ in. P. and S. bent.	K. opens ¼ in. P. and S. bent.	K. tight, P. and S. bent, Head cracked.
	Knuckle opening.	2⅝	2⅝	2⅝	2½
	3d blow, 10 ft ...	K. tight, P. and S. bent, Head cracked.	K. tight, P. and S. bent.	K. tight, P. and S. bent, Head cracked.	K. tight, P. and S. bent, Head cracked.
	Knuckle opening.	2[illegible]	2½	2½	2½
N.B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	4th blow, 15 ft. .	Head broke.	Head and Lock broke.	Head broke.	K. tight, P. and S. bent, Head cracked.
	Knuckle opening	......	.....	.	2[illegible]
	5th blow, 15 ft. ..	......	. ..	. . .	K. tight, P. and S. bent, Head cracked.
	Knuckle opening	.....	...	.	2½
	6th blow, 15 ft.	......			Shank broke and struck Head broken off.
	Knuckle opening	. .	.	.	......
dditional blows at 15 ft.		. .			......
otal blows required to break		4	4	4	6

GOULD DROP TESTS



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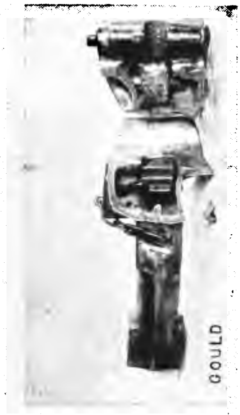

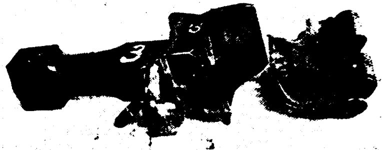

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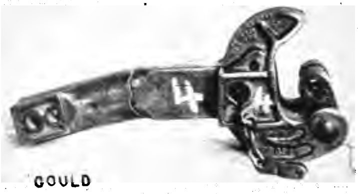
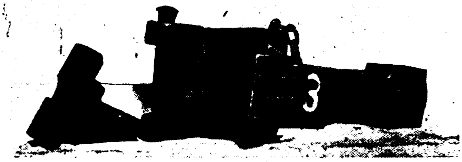
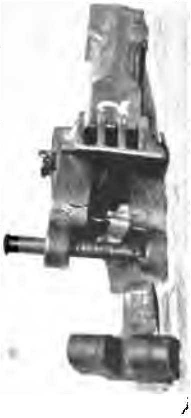
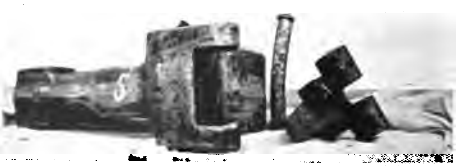


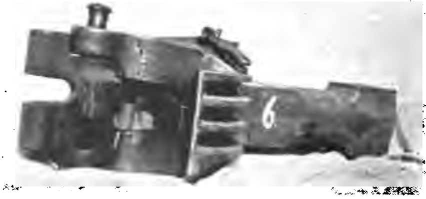
GOULD

GOULD PULLING TESTS









GOULD COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, STEEL. PIVOT PIN, STEEL, 1⅝-INCH.
Total number of parts, 9.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No 4.
Weight of Coupler complete		206	202½	203	204
" " Knuckle		35½	37	36½	35½
Does it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	+ 1/16	......	......
	B	......	......	......	......
	C	+ 3/16	......	+ ⅛	+ ⅛
	D	......	+ 1/16	+ ⅛	......
	E	+ ⅛	+ 1/16	......	+ ⅛
	F	+ ⅛	+ ⅛	......	+ ⅛
Knuckle opening before test		3¼	3¼	3 3/16	3¼
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	P. started.	......	......	K. opened ½ in. P. bent.
	Knuckle opening.	3 in.	2⅞ in.	3 in.	3 1/16
	2d blow, 10 ft	K. opened ½ in. P. bent, S. bent.	K. tight, P. bent.	K. tight, P. bent, S. started.	K. tight, P. bent ¼ in.
	Knuckle opening.	2¾	2⅝	2 13/16	2⅞
	3d blow, 10 ft	K. opened ½ in. P. bent, S. bent.	K. tight, P. bent, S. started.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening.	2¾	2⅝	2¾	2 11/16
	4th blow, 15 ft	K. tight, P. and S. bent.	Shank broke.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening.	2½	......	2⅜	2 7/16
	5th blow, 15 ft	Head broke.	......	Head broke.	Shank broke.
	Knuckle opening.	......	......	......	......
	6th blow, 15 ft	......	......	......	......
	Knuckle opening.	......	......	......	......
Additional blows at 15 ft		......	......	......	......
Total blows required to break		5	4	5	5

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		203	201	204	204	204	204	Seven couplers only were furnished, and only three pairs tested.	
" " Knuckle		36¼	37¼	37	36¾	37½	37		
Does it pass M. C.-B. Limit Gauge?		No.	record	made in	any cas	e.			
Knuckle Opening	Original	3⅜	3⅜	3 5/16	3¼	3⅜	3½		
	After 75,000 lbs	3½	3 9/16	3 7/16	3⅜	3½	3 9/16		
	" 100,000 "	3 9/16	3⅝	3 9/16	3 7/16	3⅝	3 11/16		
	" 125,000 "	3¾	3¾	3¾	3 11/16	3¾	3⅞		
Pull required to break			129,100	129,900	....	....	137,580		

REMARKS.

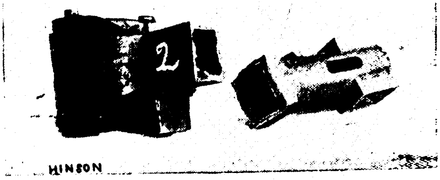
Knuckle opened all right in all cases after the test.

Pivot pins bent in every case.

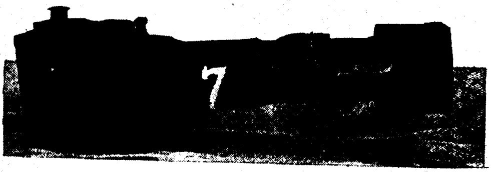
SINGLE LUG TEST.—Lower lug of No. 5 broke at load of 86,850 lbs.

DRAWBAR TEST.—Lower drawbar lug broke through pivot pin hole at 120,480 lbs.

HINSON
DROP TESTS



HINSON
PULLING TESTS



HINSON COUPLER TESTS.

Coupler Body, Mall. Iron. Knuckle, Steel. Pivot Pin, Steel, 1 3/8-inch.
Total number of parts, 8.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No 3.	Coupler No. 4.
Weight of Coupler complete		214	217	232	231
" " Knuckle		50	50	55	56
Does it pass M. C.-B. Limit Gauge?		Yes.	Yes.	Yes.	Yes.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	......	......	......
	B	......	......	......	+1/16
	C	+1/8	+1/8	+1/16	+1/16
	D	......	......	......	......
	E	+1/16	......	......	......
	F	+1/8	+1/8	+1/16	+1/8
Knuckle opening before test		3 3/16	3 1/4	3 1/8	3 1/4
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	......	S. bent.	S. bent.	S. bent.
	Knuckle opening	3	3 1/16	3 1/16	3 1/8
	2d blow, 10 ft	S. bent.	S. bent.	S. bent.	S. bent.
	Knuckle opening	2 15/16	3	3	3 1/8
	3d blow, 10 ft	S. bent.	S. bent.	P. and S. bent.	K. opens 3/4 in. P. and S. bent.
	Knuckle opening	2 7/8	3	2 15/16	3 1/16
	4th blow, 15 ft	S. bent.	S. bent.	K. opens 1/4 in. P. and S. bent.	P. and S. bent.
	Knuckle opening	2 3/4	2 15/16	2 7/8	3
	5th blow, 15 ft	S. bent.	Shank broke.	K tight, P. and S. bent.	P. and S. bent.
	Knuckle opening	2 11/16	......	2 3/4	3
	6th blow, 15 ft	S bent and holes at bottom closed.	......	K. tight, P. and S. bent.	P. and S. bent.
	Knuckle opening	......	......	2 3/4	2 7/8
Additional blows at 15 ft		3	......	3	1
Total blows required to break		9	5	9	7

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		222 1/4	224 1/2	228 1/2	223 1/2	213 1/2	211 1/2	216 1/2	209 1/2
" " Knuckle		55 1/2	56 1/2	56 1/4	54 1/2	49 1/2	50 1/2	62 1/2	50
Does it pass M. C.-B. Limit Gauge?		Yes.	Yes.	Yes.	Yes.	No.	Yes.	No.	No.
Knuckle Opening.	Original	3 3/8	3 5/16	3 5/16	3 5/16	3 1/4	3 1/4	3 1/4	3 1/8
	After 75,000 lbs	3 1/2	3 7/16	3 7/16	3 7/16	3 3/8	3 3/8	3 1/2	3 7/16
	" 100 000 "	3 9/16	3 1/2	3 1/2	3 1/2	3 7/16	3 7/16	3 5/8	3 9/16
	" 125,000 "	....	....	3 5/8	3 5/8	....	....	....	....
Pull required to break		....	125,000	....	138,200	....	112,400	124,400	....

REMARKS.

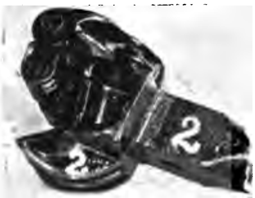
Knuckle would not open after tests in Nos. 1, 4, 5, 6 and 7.

Pivot pin was bent in all cases.

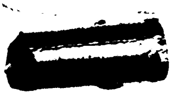
Single Lug Test.—Broke lower lug of No. 8 through pivot pin hole at 98,700 lbs.

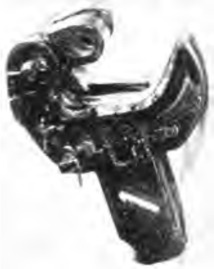
Drawbar Test.—Broke shank just ahead of yoke block at 135,100 lbs.

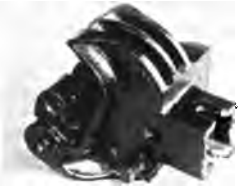
JANNEY DROP TESTS



JANNEY



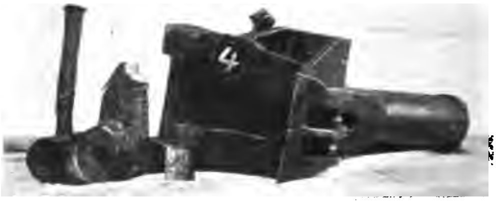


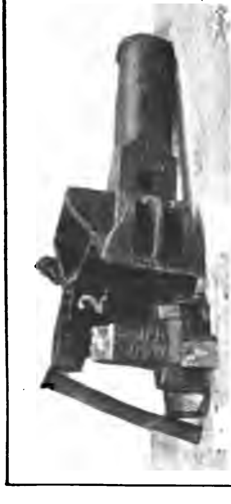


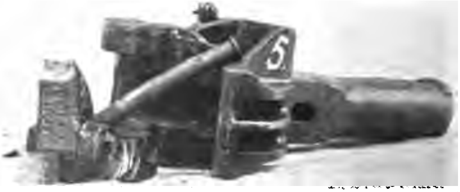
JANNEY

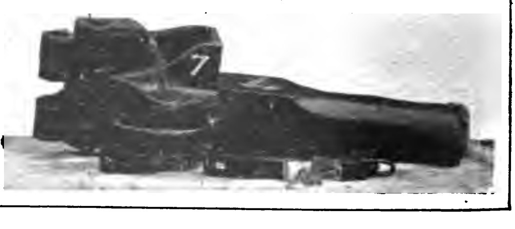
JANNEY

JANNEY PULLING TESTS









JANNEY COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, WRT. IRON. PIVOT PIN, STEEL, 1⅜ INCH.
Total number of parts, 10.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
eight of Coupler complete		216	219	215	219½
" " Knuckle		36½	36½	36½	36½
oes it pass M. C.-B. Limit Gauge ?.		No.	Yes.	Yes.	Yes.
Variation from Standard Contour Lines at (See Fig. 5.)	A ..	......	......	......	......
	B ..	......	......	......	......
	C ..	$+\frac{1}{16}$	$+\frac{1}{8}$	$+\frac{1}{16}$	$+\frac{1}{8}$
	D ..	$+\frac{1}{16}$	......	......	......
	E ..	$+\frac{1}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$
	F ..	......	$+\frac{1}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$
nuckle opening before test........		$3\frac{1}{16}$	3	$3\frac{1}{16}$	......
Defects of oupler after B.—After each w the Knuckle—K, Pin—P, hank—S, Lock—L, re examined for ects.	1st blow, 10 ft...	K. tight, S. and P. bent.	K. tight, S. and P. bent.	P. bent.	......
	Knuckle opening.	$2\frac{11}{16}$	2⅝	2¾	......
	2d blow, 10 ft...	K. tight, S. and P. bent.	K. tight, S. and P. bent.	K. tight, S. and P. bent.	....
	Knuckle opening.	2½	2½	2½	......
	3d blow, 10 ft ...	K. tight, S. and P. bent.	K. tight, S. and P. bent.	K. tight, S. and P. bent.	......
	Knuckle opening.	$2\frac{7}{16}$	......	$2\frac{5}{16}$	......
	4th blow, 15 ft...	K. tight, upset, S. and P. bent at holes.	Shank broke.	Shank broke.	......
	Knuckle opening.	2¼ inches.	......	......	......
	5th blow, 15 ft...	Shank broke.	......	......	......
	Knuckle opening.	......	......	......	......
	6th blow, 15 ft...	......	......	......	......
	Knuckle opening.	......	......	......	......
lditional blows at 15 ft..........		......	......	......	......
otal blows required to break		5	4	4	......

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
eight of Coupler complete......		215	216¼	217½	215¼	213	216¼	218¼	211¾
" " Knuckle		37½	38¼	37½	37¼	37¼	37½	36¾	37¼
es it pass M. C.-B. Limit Gauge ?		No.	No.	Yes.	No.	No.	No.	No.	No.
nuckle pening	Original	3⅜	3⅜	3¼	3⅜	3⅜	$3\frac{5}{16}$	$3\frac{5}{16}$	$3\frac{5}{16}$
	After 75,000 lbs ...	3¾	$3\frac{13}{16}$	3⅝	3¾	$3\frac{13}{16}$	3⅝	$3\frac{13}{16}$	$3\frac{11}{16}$
	" 100,000 " ...	....	....	....	....	....	....	....	....
	" 125,000 " ...	....	....	....	....	....	....	....	....
ll required to break		91.300	....	....	84,150	93,400	....	92,800	... ...

REMARKS.

In all cases knuckles opened all right after test.

In all cases pivot pin was bent.

SINGLE LUG TEST.—Both pivot pins bent at 61,100 lbs. so that couplers slipped apart. They were again adjusted with emery cloth between the knuckles, when lower lug of No. 6 broke at 71,400 lbs.

DRAWBAR TEST.—Lower drawbar lug broke and the pivot pin sheared at 135,200 lbs.

JOHNSON
DROP TESTS

JOHNSON

JOHNSON

JOHNSON

JOHNSON

JOHNSON
PULLING TESTS

JOHNSON COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-IN.
Total number of parts, 11.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
'eight of Coupler complete		180½	180½	176	195½
" " Knuckle		36	36½	36	36
oes it pass M. C.-B. Limit Gauge ?		No.	Yes.	Yes.	Yes.
Variation from Standard Contour Lines at (See Fig. 5.)	A	$+\frac{1}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$	$+\frac{1}{16}$
	B	......	$+\frac{1}{16}$	......	......
	C	+⅛	+⅛	+⅛	+⅛
	D	$+\frac{1}{16}$	......	$+\frac{1}{16}$	......
	E	$+\frac{1}{16}$	......	$+\frac{1}{16}$	......
	F	......	+⅛	$+\frac{1}{16}$	+⅛
nuckle opening before test		3¼	$3\frac{3}{16}$	$3\frac{5}{16}$	$3\frac{5}{16}$
Defects of Coupler after . B.—After each ›w the Knuckle—K, Pin—P, Shank—S, Lock—L, re examined for fects.	1st blow, 10 ft	S. bent.	S. bent.	S. bent.	......
	Knuckle opening	2¾	$2\frac{13}{16}$	2¾	$2\frac{13}{16}$
	2d blow, 10 ft	S. bent.	S. bent.	K. opens ¾ in. P. and S. bent.	P. and S. bent.
	Knuckle opening	$2\frac{11}{16}$	2¾	2⅝	$2\frac{9}{16}$
	3d blow, 10 ft	S. bent.	Broke shank.	Broke shank.	Broke shank.
	Knuckle opening	$2\frac{11}{16}$	......	......	......
	4th blow, 15 ft	P. and S. bent.	......	......	......
	Knuckle opening	$2\frac{9}{16}$	......	......	......
	5th blow, 15 ft	Broke shank.	......	......	......
	Knuckle opening	......	......	......	......
	6th blow, 15 ft	......	......	......	......
	Knuckle opening	......	......	......	......
dditional blows at 15 ft		......	......	......	......
›tal blows required to break		5	3	3	3

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No 6.	Coupler No 7.	Coupler No. 8.
'eight of Coupler complete		177	175	176½	179½	177	175½	176½	176
" " Knuckle		35½	36	35½	35½	36½	36¼	35½	35½
oes it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.	No	No.	No.	No.
‹nuckle ›pening	Original	3¼	3⅛	3⅛	3⅛	3⅛	$3\frac{3}{16}$	3⅛	$3\frac{5}{16}$
	After 75.000 lbs	....	....	3⅜	$3\frac{5}{16}$	3⅜	$3\frac{7}{16}$	....	....
	" 100,000 "	....	....	....	....	....	....	....	....
	" 125,000 "	....	....	....	....	....	....	....	....
ıll required to break		49,800	....	....	83,100	79,300	....	75,000	....

REMARKS.

Knuckle was pulled out in No. 1, and would not open after test in all other cases.

Pivot pin bent in all cases.

SINGLE LUG TEST.—Broke both drawbar lugs at 59,900 lbs.

DRAWBAR TEST.—Broke drawbar lug at 117,100 lbs.

LUDLOW PULLING TESTS

LUDLOW COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, MALL. IRON. PIVOT PIN, MALL. IRON, HOLLOW, 2½ OUTSIDE, 1⅝ HOLE.

Total number of parts, 12.

PULLING TESTS.		Coupler No 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
ight of Coupler complete......		225	223½	223¾	223	224¼	215	223	221½
" " Knuckle		68½	69¼	69	69¼	69½	69	68¼	68
s it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.	No.	No.	No.	No.
uckle ening	Original...........	$3\frac{7}{16}$	$3\frac{7}{16}$	3⅜	3½	3⅜	$3\frac{5}{16}$	$3\frac{7}{16}$	$3\frac{5}{16}$
	After 75,000 lbs...	....	....	....	....	$3\frac{9}{16}$	$3\frac{11}{16}$	....	....
	" 100,000 " ...	....	....	....	....	....	....	....	....
	" 125,000 " ...	....	....	....	....	....	....	....	....
required to break		67,600	....	68,100	....	....	80,800	61,000	....

REMARKS.

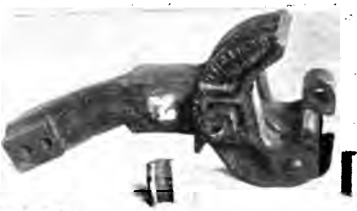
Knuckle broke in Nos. 1, 3, 6 and 7, and opened all right after tests in other cases.

Pivot pin broke in Nos. 2 and 3, and in No. 5 at 51,000 lbs.; all right in other cases.

SINGLE LUG TEST.—No. 4 broke through pivot pin hole at 50,800 lbs.

DRAWBAR TEST.—Broke through shank, 2¾ inches from rear end, at 79,950 lbs.

NATIONAL OR PERFECTED DROP TESTS



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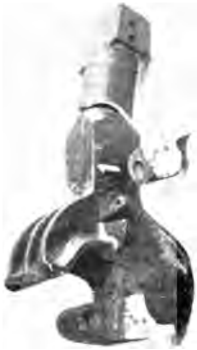

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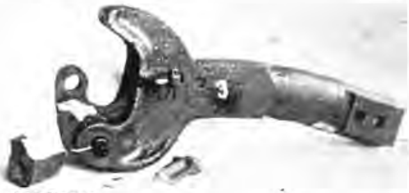

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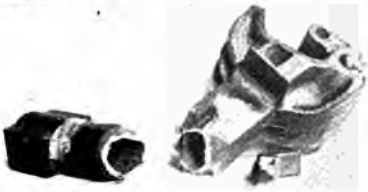

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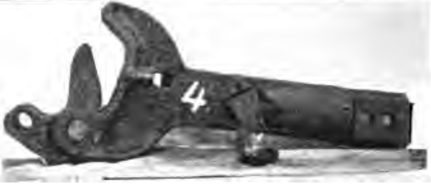
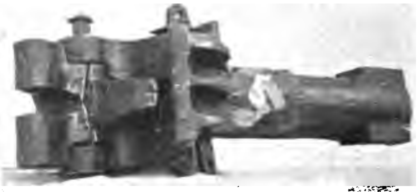
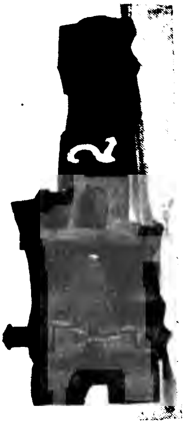
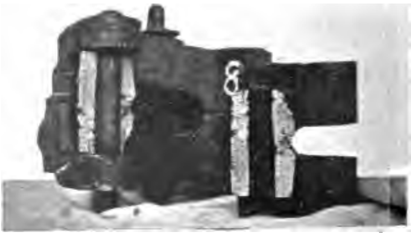
NATIONAL OR PERFECTED PULLING TESTS









NATIONAL (FORMERLY PERFECTED) COUPLER TESTS.

COUPLER BODY, O. H. STEEL, KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-INCH.
Total number of parts, 10.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		212	216	212½	212½
" " Knuckle		50½	51	52	52
Does it pass M. C.-B. Limit Gauge?		No.	No.	Yes.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	+ $\frac{1}{16}$	+ ⅛	......	......
	B	......	+ ⅛	+ ⅛	......
	C	......	......	+ $\frac{1}{16}$	+ $\frac{1}{16}$
	D	+ $\frac{1}{16}$	......	......	+ $\frac{1}{16}$
	E	......	+ ⅛	+ ¼	+ ⅛
	F	+ ⅛	+ $\frac{3}{16}$	+ ¼	+ $\frac{3}{16}$
Knuckle opening before test		3	+ 3$\frac{1}{16}$	3⅛	3 $\frac{1}{16}$
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	......	S. started.	S. started.	S. started.
	Knuckle opening	2¾	2$\frac{13}{16}$	2¾	2¾
	2d blow, 10 ft	S. started.	S. bent.	S. bent.	S. bent,
	Knuckle opening	2$\frac{11}{16}$	2⅝	2⅝	2$\frac{11}{16}$
	3d blow, 10 ft	S. bent.	S. bent.	K. tight, P. and S. bent.	P. and S. bent.
	Knuckle opening	2$\frac{9}{16}$	2½	2½	2⅝
	4th blow, 15 ft	Knuckle broke thro' lower lug.	K. opens ½ in. P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening	......	2¼	2¼	2½
	5th blow, 15 ft	......	K. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening	......	2¼	1¾	2½
	6th blow, 15 ft	......	K. tight, P. and S. bent.	Knuckle broke through lower lug.	K. tight, P. and S. bent.
	Knuckle opening	......	......	......	2$\frac{5}{16}$
Additional blows at 15 ft		......	2	......	2
Total blows required to break		4	8	6	8

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		217	216½	208	218½	213	206½	215	215
" " Knuckle		49¾	50½	50¼	51	48¾	49½	50½	49
Does it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.	No	No.	No.	No.
Knuckle Opening	Original	3⅜	3$\frac{5}{16}$	3¼	3$\frac{5}{16}$	3⅜	3⅜	3$\frac{3}{16}$	3¼
	After 75,000 lbs	3$\frac{9}{16}$	3$\frac{7}{16}$	3½	3⅝	3½	3½	3⅜	3$\frac{7}{16}$
	" 100,000 "	3$\frac{11}{16}$	3½	3$\frac{9}{16}$	3¾	3$\frac{9}{16}$	3⅝	3$\frac{7}{16}$	3½
	" 125,000 "	3$\frac{13}{16}$	3⅝	3$\frac{11}{16}$	3⅞	3$\frac{13}{16}$	3¾	3$\frac{9}{16}$	3⅝
Pull required to break		....	135,400	....	155,400	128,300	....	....	168,600

REMARKS.

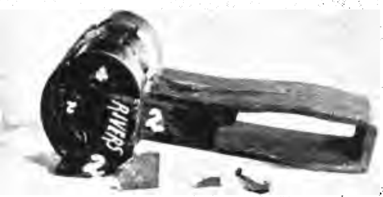
Knuckles broken in Nos. 2, 5 and 8. Knuckle would not open after test except in No. 6.

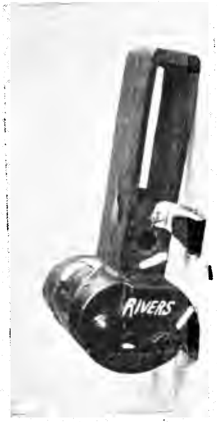
Pivot pin was bent in all cases.

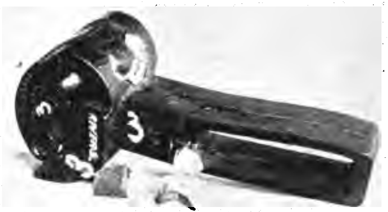
SINGLE LUG TEST.—Coupler No. 6 broke through pivot pin hole at load of 127,100 lbs.

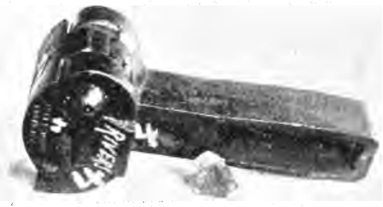
DRAWBAR TESTS.—Broke at junction of head and shank at 224,900 lbs.

RIVERS
DROP TESTS

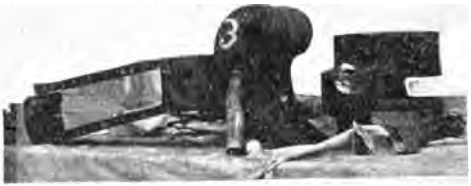


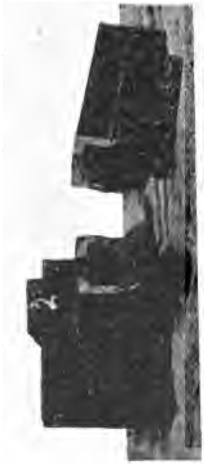


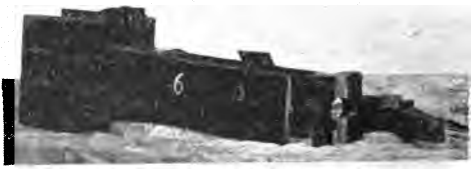


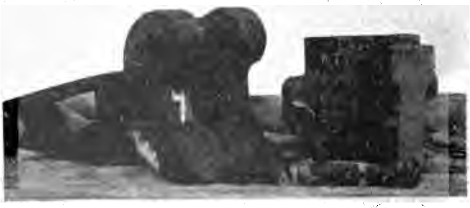


RIVERS
PULLING TESTS









RIVERS COUPLER TESTS.

COUPLER BODY, O. H. STEEL. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-INCH.
Total number of parts, 4.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
ight of Coupler complete		262½	250	253	251
" Knuckle		81	80	80	80
s it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A..	+ ⅛	+ ½	+ ⅛	+ ¼
	B..	+ 1¼	+ 1⅜	+ 1¼	+1¼
	C..	+ $\frac{1}{16}$	+ ⅛	+ ⅛	+ ⅛
	D..	......	......	......	......
	E..	+ ¼	......	......	......
	F..	+ ⅜	+ ⅜	+ ⅜	+ $\frac{5}{16}$
ickle opening before test		3⅜	3½	3⅝	3½
)efects of upler after .—After each the uckle—K, ı—P, ank—S, ck—L, examined for ts.	1st blow, 10 ft...	Head broke.	S bent, Head cracked.	S. bent, Head cracked.	S. bent, Head cracked.
	Knuckle opening.	......	2½	2⅝	2¼
	2d blow, 10 ft ...	......	Head broke.	Head and Knuckle broke.	Head broke.
	Knuckle opening.	......	......	......	......
	3d blow, 10 ft ...	......	......	......	......
	Knuckle opening.	......	......	......	......
	4th blow, 15 ft...	......	......	......	......
	Knuckle opening.	......	......	......	......
	5th blow, 15 ft...	......	......	......	......
	Knuckle opening.	......	......	......	......
	6th blow, 15 ft...	......	......	......	......
	Knuckle opening.	......	......	......	......
itional blows at 15 ft		......	......	......	......
l blows required to break		1	2	2	2

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
ght of Coupler complete		262	251½	252½	254½	255	253½	254½	256½
" Knuckle		81½	82	82	82½	82½	82	81¾	82¼
s it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.	No.	No.	No.	No.
uckle ening	Original	4½	4⅝	4½	4⅝	4$\frac{9}{16}$	4¾	4⅝	4$\frac{13}{16}$
	After 75,000 lbs...	.....	.....	5	5	5¼	5$\frac{3}{16}$	5$\frac{3}{16}$	5¼
	" 100,000 " ...	.....	.....	5⅜	5¼	5½	5$\frac{7}{16}$	5½	5$\frac{7}{16}$
	" 125,000 " ...	.....	.....	5$\frac{11}{16}$	5⅝	5¾	5¾	5⅞	5⅝
required to break		.....	61,300	.....	143,400	.....	129,000	141,200	

REMARKS.

Knuckle opened all right after test in all cases.

Pivot pin was bent in all cases except No. 1.

SINGLE LUG TEST.—Broke knuckle of No. 8 at 119,200 lbs.

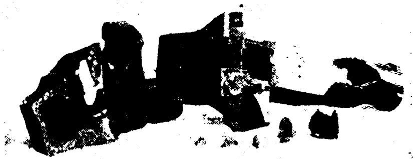
DRAWBAR TEST.— None made on account of construction.

STANDARD DROP TESTS

STANDARD

STANDARD

STANDARD



STANDARD

STANDARD PULLING TESTS

STANDARD COUPLER TESTS.

Coupler Body, Mall. Iron. Knuckle, Pressed Steel. No Pivot Pin.
Total number of parts, 4.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		226	226	225	225
" " Knuckle		68½	65	67	67½
Does it pass M. C.-B. Limit Gauge		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	+⅛	+¼	+⅛	+$\frac{3}{16}$
	B	......	+$\frac{3}{16}$	+$\frac{1}{16}$	+$\frac{1}{16}$
	C	......	......	......	......
	D	......	......	......	......
	E	......	......	+$\frac{1}{16}$	......
	F	+$\frac{3}{16}$	+$\frac{3}{16}$	+⅛	+⅛
Knuckle opening before test		3¼	3¼	3	3⅛
Defects of Coupler after N. B.—After each blow the Knuckle—K, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	......	......	......	......
	Knuckle opening	3	$2\frac{15}{16}$	2⅞	$2\frac{15}{16}$
	2d blow, 10 ft	......	......	S. bent.	......
	Knuckle opening	$2\frac{15}{16}$	2⅞	2⅞	2⅞
	3d blow, 10 ft	S. bent.	......	S. bent.	S. bent.
	Knuckle opening	$2\frac{15}{16}$	2⅞	$2\frac{13}{16}$	$2\frac{13}{16}$
	4th blow, 15 ft	S. bent.	S. bent.	S. bent.	S. bent.
	Knuckle opening	$2\frac{13}{16}$	2¾	$2\frac{13}{16}$	2¾
	5th blow, 15 ft	K. and L. tight, S. cracked.	S. bent, Head cracked.	L. tight, S. bent.	L. tight, S. bent.
	Knuckle opening	$2\frac{11}{16}$	2⅝	$2\frac{11}{16}$	2¾
	6th blow, 15 ft	Head broke.	S. bent.	L. tight, S. bent.	L. tight, S. bent,
	Knuckle opening	......	......	$2\frac{11}{16}$	2¾
Additional blows at 15 ft		......	3	3	4
Total blows required to break		6	9	9	10

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		221½	223½	220½	222	220¾	221	224	222¼
" " Knuckle		66	66½	66¾	67½	65½	66¾	67¼	66
Does it pass M.C.-B. Limit Gauge?		No.	No.	Yes.	No.	No.	No.	No.	No.
Knuckle Opening	Original	3½	3⅜	$3\frac{5}{16}$	3⅜	$3\frac{5}{16}$	$3\frac{5}{16}$	$3\frac{5}{16}$	$3\frac{9}{16}$
	After 75,000 lbs.	$3\frac{11}{16}$	3⅝	$3\frac{11}{16}$	3⅝	$3\frac{11}{16}$	$3\frac{9}{16}$	$3\frac{9}{16}$	$3\frac{13}{16}$
	" 100,000 "	$3\frac{13}{16}$	3¾	$3\frac{11}{16}$	3¾	$3\frac{13}{16}$	3¾	$3\frac{11}{16}$	3⅞
	" 125,000 "	3⅞	$3\frac{15}{16}$	$3\frac{13}{16}$	3⅞	$3\frac{15}{16}$	3⅞	$3\frac{15}{16}$	4
Pull required to break		....	149,400	....	164,800	....	153,100	....	164,500

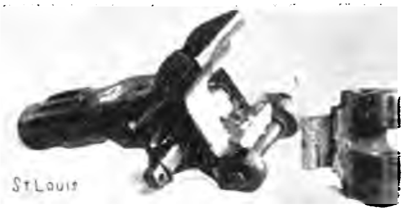
REMARKS.

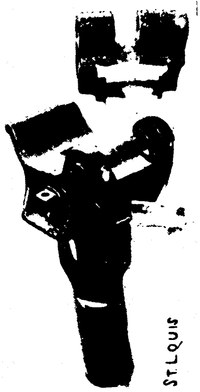
Knuckle was broken after test in Nos. 4, 6 and 8. Knuckle would not open in Nos. 1, 3 and 7.

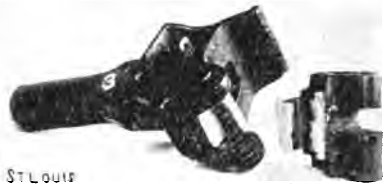
Single Lug Test.—Broke knuckle of No. 3 at 106,000 lbs.

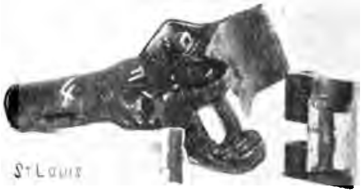
Drawbar Test.—No test made, as there was no pin hole.

ST. LOUIS DROP TESTS

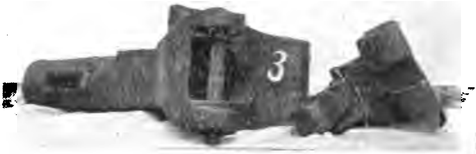


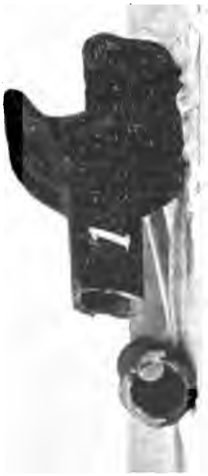


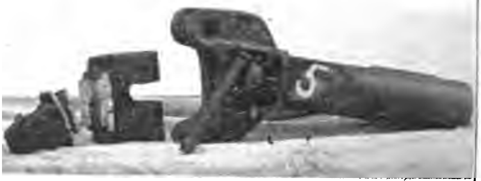


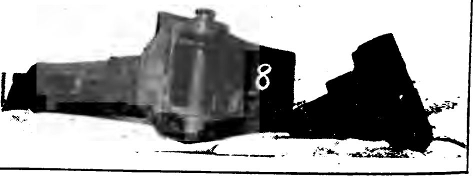


ST. LOUIS PULLING TESTS









ST. LOUIS COUPLER TESTS.

COUPLER BODY, STEEL. KNUCKLE, STEEL. PIVOT PIN, STEEL, 1¼-INCH.
Total number of parts, 6.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		217½	217	214	219½
" " Knuckle		61	62	62	61
Does it pass M. C.-B. Limit Gauge ?		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	......	......	......
	B	+ ⅛	......	+ ⅛	+ ⅛
	C	......	......	......	......
	D	......	$-\frac{1}{16}$	......	......
	E	......	+ ⅛	+ $\frac{1}{16}$	+ ⅛
	F	+ ⅛	+ $\frac{3}{16}$	+ ⅛	+ ⅛
Knuckle opening before test		3¼	$3\frac{3}{16}$	3⅛	3⅛
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	......	......	......	......
	Knuckle opening	$3\frac{1}{16}$	$2\frac{15}{16}$	$2\frac{15}{16}$	2⅞
	2d blow, 10 ft	......	K. tight, P. started	......	......
	Knuckle opening	3	2⅞	2⅞	2⅞
	3d blow, 10 ft	S. bent.	K. crkd. & tight, P. bent, S. start'd	K. crkd. & tight.	S. bent.
	Knuckle opening	2⅞	2½	2½	2¾
	4th blow, 15 ft	K. cr'kd & tight, P. and S. bent.	K. opened, P. and S. bent.	Knuckle broke.	K. cracked, P. and S. bent.
	Knuckle opening	2⅜	2	......	$1\frac{15}{16}$
	5th blow, 15 ft	Knuckle broke.	Knuckle broke.	......	Knuckle broke.
	Knuckle opening	......	......	......	......
	6th blow, 15 ft	......	......	......	......
	Knuckle opening	......	......	......	......
Additional blows at 15 ft		......	......	......	......
Total blows required to break		5	5	4	5

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		208½	211¾	211¼	211¾	207½	212	216½	216
" " Knuckle		61	61¼	61¼	61¼	61	61	62	61
Does it pass M. C.-B. Limit Gauge ?		No record made in any case.							
Knuckle Opening	Original	3⅛	3⅛	3¼	3⅛	$3\frac{3}{16}$	3¼	$3\frac{3}{16}$	3⅛
	After 75,000 lbs	$3\frac{5}{16}$	3¼	3⅜	$3\frac{5}{16}$	$3\frac{5}{16}$	3⅜	3¼	3¼
	" 100,000 "	$3\frac{7}{16}$	3⅜	3½	$3\frac{7}{16}$	3⅜	3½	3⅜	3⅜
	" 125,000 "	3⅝	$3\frac{9}{16}$	.....	.....	3½	$3\frac{9}{16}$	.....	.....
Pull required to break		134,000	....	123,700	.....	146,500	.....	.....	124,000

REMARKS.

Knuckle opened all right after test, except Nos. 7 and 8.

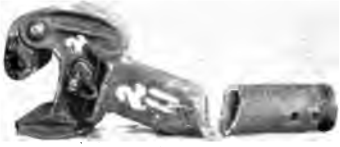
Pivot pin bent $\frac{1}{16}$ inch in Nos. 3, 4, 5 and 8.

Wrought-iron locking pins used in all but 7 and 8, where steel locking pins were used.

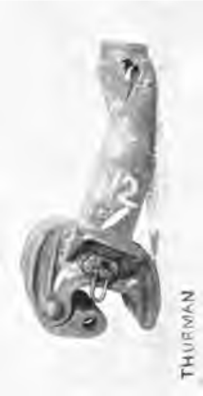
SINGLE LUG TEST.—Broke lower lug of No. 6 at 116,100 lbs.

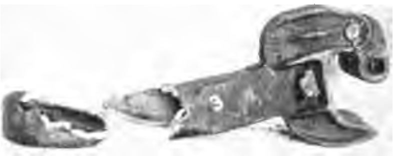
DRAWBAR TEST.—Drawbar broke through upper lug at hinge pin hole at 135,700 lbs. A fracture also started in the lower lug at its junction with head.

THURMOND DROP TESTS

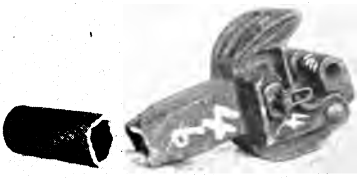


THURMAN



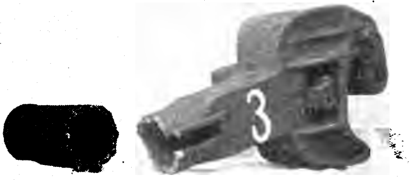


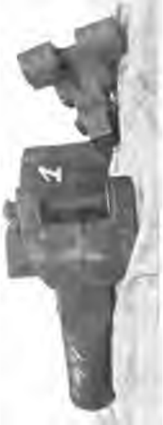
THURMAN

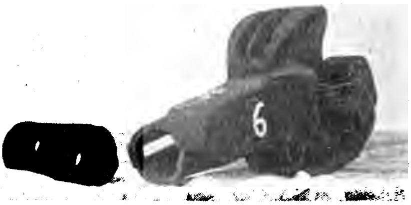


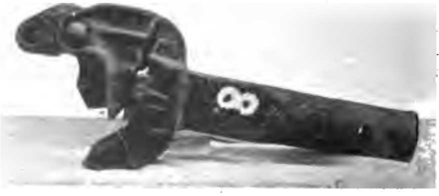
THURMAN

THURMOND PULLING TESTS









THURMOND COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1½-INCH.
Total number of parts, 8.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
ight of Coupler complete		214½	214	214	212½
" " Knuckle		50½	50½	50½	50½
es it pass M. C.-B. Limit Gauge?		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	+ $\frac{1}{16}$	......	+ ⅛
	B	......	+ $\frac{1}{16}$	+ $\frac{1}{16}$	+ ⅛
	C	+ $\frac{1}{16}$	......	+ ⅛	......
	D	+ $\frac{3}{16}$	+ $\frac{1}{16}$	+ $\frac{3}{16}$	......
	E	— ¼	— $\frac{3}{16}$	+ ¼	— $\frac{3}{16}$
	F	— ⅛	......	— $\frac{1}{16}$	+ $\frac{1}{16}$
uckle opening before test		3$\frac{3}{16}$	3$\frac{3}{16}$	3⅛	3⅛
Defects of oupler after B.—After each the nuckle—K, in—P, ank—S, ock—L, examined for cts.	1st blow, 10 ft.	......	......	S. bent.	S. bent.
	Knuckle opening.	2$\frac{11}{16}$	2⅞	2$\frac{15}{16}$	2⅞
	2d blow, 10 ft	......	......	S. bent and upset at holes.	Shank broke.
	Knuckle opening.	2⅝	2⅝	2⅞	......
	3d blow, 10 ft	......	Shank broke.	K. opened ½ in. P. and S. bent and upset.	......
	Knuckle opening.	2½	......	2¾	......
	4th blow, 15 ft.	K. tight, P. bent.	......	K. tight, P. bent, S. cracked and upset.	......
	Knuckle opening.	2	......	2⅝	......
	5th blow, 15 ft.	K. tight, P. bent, S. upset at holes.	......	K. tight, P. bent, S. cracked.	......
	Knuckle opening.	2	......	2$\frac{9}{16}$	......
	6th blow, 15 ft.	K. tight, P. bent, S. more upset.	......	K. tight, P. bent, S. cracked more.	......
	Knuckle opening.	2	......	2⅜	......
ditional blows at 15 ft		3	......	1	......
al blows required to break		9	3	7	2

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
ight of Coupler complete		204	205½	203½	207½	205	204½	205½	205½
" " Knuckle		50½	51	50¼	50¾	50½	51	51	51
es it pass M. C.-B. Limit Gauge?		No	record	made in	any	case.			
nuckle ening	Original	3¼	3¼	3¼	3¼	3¼	3¼	3⅜	3¼
	After 75,000 lbs	3½	3½	3⅜	3½	3⅜	3½	3½	3⅜
	" 100,000 "	3½	3⅝	3½	3$\frac{9}{16}$	3½	3⅝	3$\frac{9}{16}$	3$\frac{7}{16}$
	" 125,000 "	3⅝	3¾	3⅝	3¾	.....	.....	3⅝	3½
l required to break		145,000	.....	131,900	.....	.....	106,100	.....	137,500

REMARKS.

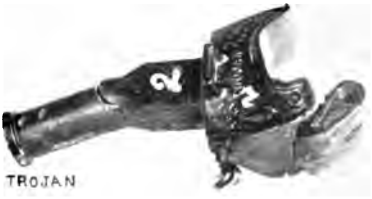
Knuckle opened all right in all cases after the test, except in No. 1, where knuckle was broken.

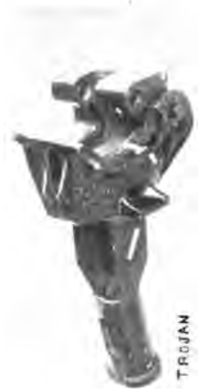
Pivot pin was slightly bent in Nos. 2, 3, 6 and 7.

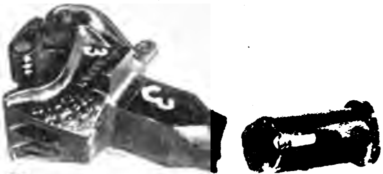
SINGLE LUG TEST.—Knuckles slipped apart at 111,000 lbs.; readjusted and broke at 113,700 lbs. Another knuckle was furnished, when lower lug broke with load of 107,600 lbs.

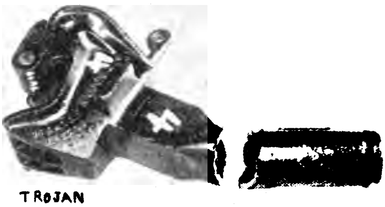
DRAWBAR TEST.—Broke at 112,100 lbs., through shank 8½ inches from end.

TROJAN
DROP TESTS

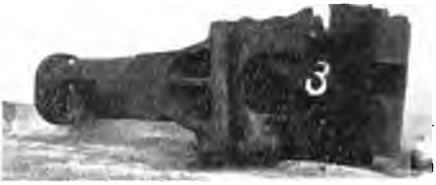


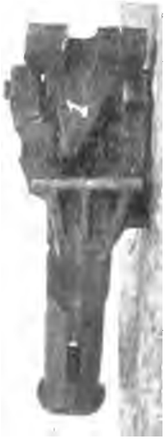


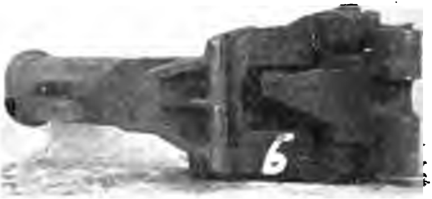


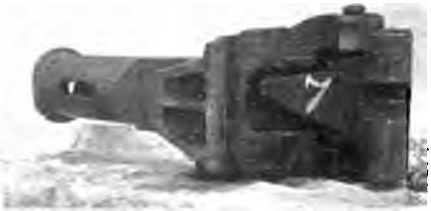


TROJAN
PULLING TESTS









TROJAN COUPLER TESTS.

COUPLER BODY, MALL. IRON. KNUCKLE, STEEL. PIVOT PIN, STEEL, 1⅜-INCH.
Total number of parts, 7.

DROP TESTS.		Coupler No. 1.	Couple No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		$218\frac{1}{2}$	$220\frac{1}{2}$	218	220
" " Knuckle		52	52	52	51
Does it pass M. C.-B. Limit Gauge?		Yes.	Yes.	No.	Yes.
Variation from Standard Contour Lines at (See Fig. 5.)	A	$+\frac{1}{16}$	$+\frac{1}{8}$	$+\frac{1}{16}$	......
	B	......	......	......	......
	C	......	......	......	......
	D	......	......	......	......
	E	$+\frac{1}{8}$	$+\frac{3}{16}$	$+\frac{1}{16}$	$+\frac{1}{8}$
	F	$+\frac{1}{4}$	$+\frac{1}{4}$	$+\frac{1}{4}$	$+\frac{1}{4}$
Knuckle opening before test		$3\frac{1}{4}$	$3\frac{3}{16}$	$3\frac{3}{16}$	$3\frac{3}{16}$
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	......	S. bent.	S. bent.	S. bent.
	Knuckle opening	3	3	3	$3\frac{1}{16}$
	2d blow, 10 ft	S. bent.	S. bent.	S. bent.	S. bent.
	Knuckle opening	3	$2\frac{15}{16}$	$2\frac{15}{16}$	3
	3d blow, 10 ft	Shank broke.	S. bent.	S. cracked, Face cracked.	S. bent.
	Knuckle opening	......	$2\frac{7}{8}$	$2\frac{15}{16}$	$2\frac{15}{16}$
	4th blow, 15 ft	......	Shank broke.	Shank broke.	Shank broke.
	Knuckle opening	......	......	......	......
	5th blow, 15 ft	......	......	......	......
	Knuckle opening	......	......	......	......
	6th blow, 15 ft	......	......	......	......
	Knuckle opening	......	......	......	......
Additional blows at 15 ft		......	......	......	......
Total blows required to break		3	4	4	4

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No 5.	Coupler No. 6.	Coupler No. 7:	Coupler No. 8.
Weight of Coupler complete		$215\frac{1}{2}$	$217\frac{1}{2}$	215	216	220	$217\frac{1}{4}$	$215\frac{3}{4}$	$214\frac{3}{4}$
" " Knuckle		$52\frac{1}{2}$	52	$52\frac{1}{2}$	$51\frac{3}{4}$	53	$52\frac{1}{2}$	$52\frac{1}{2}$	$51\frac{1}{4}$
Does it pass M. C.-B. Limit Gauge?		Yes.	No.	Yes.	No.	No.	No.	No.	No.
Knuckle Opening	Original	$3\frac{5}{16}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{7}{16}$	$3\frac{5}{16}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$
	After 75,000 lbs.	$3\frac{5}{8}$	$3\frac{9}{16}$	$3\frac{9}{16}$	$3\frac{5}{8}$	$3\frac{9}{16}$	$3\frac{5}{8}$	$3\frac{5}{8}$	$3\frac{9}{16}$
	" 100,000 "	$3\frac{3}{4}$	$3\frac{3}{4}$	$3\frac{11}{16}$	$3\frac{3}{4}$	$3\frac{3}{4}$	$3\frac{13}{16}$	$3\frac{3}{4}$	$3\frac{11}{16}$
	" 125,000 "	....	....	4	$4\frac{1}{16}$	$3\frac{15}{16}$	4	4	$4\frac{1}{16}$
Pull required to break		125,000	....	136,000	....	....	134,300	136,100	....

REMARKS.

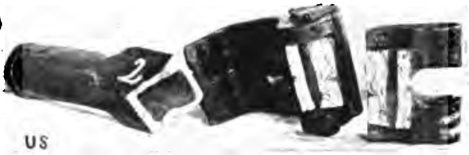
In all cases knuckles opened all right after test.

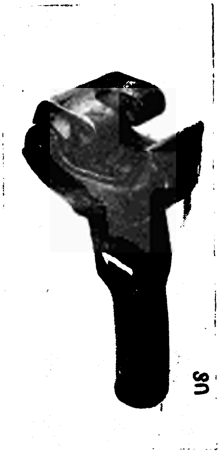
In all cases pivot pin was bent.

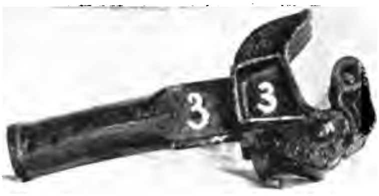
SINGLE LUG TEST.—Pivot pins bent at 98,500 lbs. and allowed couplers to spring apart.

DRAWBAR TEST.—Shank of drawbar broke, 10 inches from the end, at 143,600 lbs.

UNITED STATES DROP TESTS







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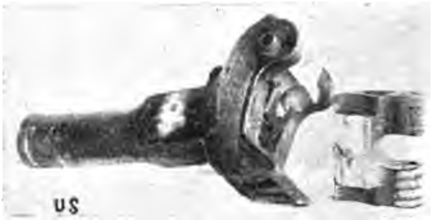
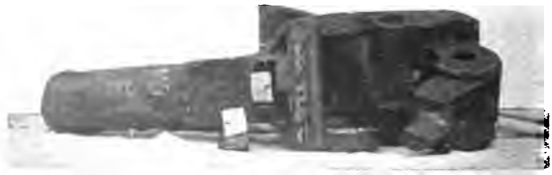


UNITED STATES PULLING TESTS



UNITED STATES COUPLER TESTS.

COUPLER BODY, O. H. STEEL. KNUCKLE, O. H. STEEL. PIVOT PIN, STEEL, 1 1/2-INCH.
Total number of parts, 5.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
Weight of Coupler complete		246 1/2	245	245	243
" " Knuckle		70	70	70	70
Does it pass M. C.-B. Limit Gauge ?		No.	No.	No.	Yes.
Variation from Standard Contour Lines at (See Fig. 5.)	A	......	......	......	......
	B	+ 1/16	......	+ 1/16	......
	C	+ 1/16	+ 1/16	+ 1/8	+ 1/8
	D	+ 1/16	......	+ 1/8	......
	E	+ 1/16	+ 1/16	......	+ 1/16
	F	+ 3/16	+ 3/16	+ 1/8	+ 3/16
Knuckle opening before test		3 3/8	3 1/4	3 3/8	3 1/4
Defects of Coupler after N. B.—After each blow the Knuckle—K, Pin—P, Shank—S, Lock—L, were examined for defects.	1st blow, 10 ft	......	S. bent.	......	......
	Knuckle opening.	3 1/4	3 1/8	3 1/4	3 1/4
	2d blow, 10 ft	......	S. bent.	......	......
	Knuckle opening.	3 3/16	3 1/16	3 1/4	3 3/16
	3d blow, 10 ft	S. bent.	S. bent.	......	......
	Knuckle opening.	3 1/8	3 1/16	3 3/16	3 3/16
	4th blow, 15 ft	K. opens 1/2 in. S. bent.	S. bent.	......	K. opens 1/2 in.
	Knuckle opening.	3 1/16	3	3 1/8	3 3/16
	5th blow, 15 ft	S. bent.	K. opens 1/2 in. P. and S. bent.	K. opens 1/2 in. P. and S. bent.	K. opens 1/4 in. P. and S. bent.
	Knuckle opening.	2 15/16	3	3 1/16	3 1/8
	6th blow, 15 ft	K. opens 1/2 in. P. and S. bent.	K. opens 1/2 in. P. and S. bent.	K. opens 1/2 in. P. and S. bent.	K. opens 1/4 in. P. and S. bent.
	Knuckle opening.	2 7/8	2 7/8	3	3
Additional blows at 15 ft		14	5	14	8
Total blows required to break		20	11	20	14

PULLING TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.	Coupler No. 5.	Coupler No. 6.	Coupler No. 7.	Coupler No. 8.
Weight of Coupler complete		242 1/4	244	243 1/4	239 1/2	245 1/2	242	247 1/2	242 1/4
" " Knuckle		71	70 1/2	69 1/4	70 1/2	70 3/4	70	71	71 1/2
Does it pass M. C.-B. Limit Gauge ?		No.	No.	No.	No.	Yes.	No.	No.	No.
Knuckle Opening	Original	3 7/16	3 7/16	3 7/16	3 7/16	3 5/16	3 3/8	3 5/16	3 3/16
	After 75,000 lbs	3 3/4	3 9/16	3 9/16	3 9/16	3 9/16	3 5/8	3 3/8	3 5/16
	" 100,000 "	3 7/8	3 3/4	3 11/16	3 11/16	3 11/16	3 3/4	3 7/16	3 3/8
	" 125,000 "	....	....	3 13/16	3 13/16	....	....	3 5/8	3 1/2
Pull required to break		108,000	....	....	133,800	....	116,000	....	148,800

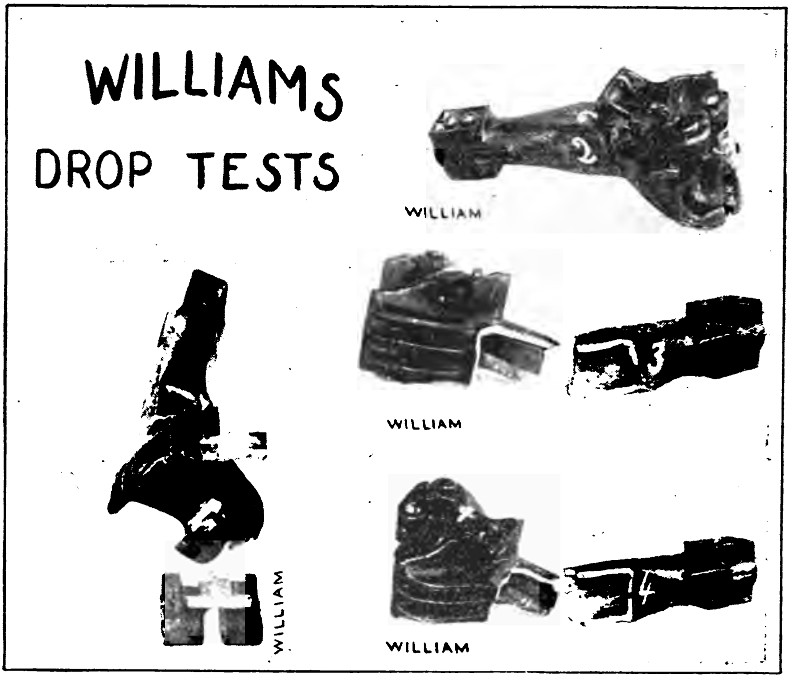
REMARKS.

Knuckle opened all right after test in all cases.

Pivot pin bent in all cases.

SINGLE LUG TEST.—Both locks were wedged before test. Broke upper lug of No. 7 at 137,100 lbs.

DRAWBAR TEST.—Broke drawbar lug at 226,800 lbs.



WILLIAMS DROP TESTS

WILLIAMS COUPLER TESTS.

COUPLER BODY, BASIC STEEL. KNUCKLE, BASIC STEEL. PIVOT PIN, STEEL, 1⅜-INCH.
Total number of parts, 12.

DROP TESTS.		Coupler No. 1.	Coupler No. 2.	Coupler No. 3.	Coupler No. 4.
ght of Coupler complete........		207	207	211½	212½
‘ “ Knuckle		42½	43	43	43
s it pass M. C.-B. Limit Gauge?.		No.	No.	No.	No.
Variation from Standard Contour Lines at (See Fig. 5.)	A ..	......	$-\frac{3}{16}$	......	......
	B ..	+¼	+⅛	$+\frac{3}{16}$	+¼
	C ..	$+\frac{3}{16}$	$+\frac{5}{16}$	$+\frac{1}{16}$	$+\frac{3}{16}$
	D ..	......	$-\frac{1}{16}$	......	$-\frac{1}{16}$
	E ..	......	$-\frac{1}{16}$	......	$+\frac{1}{16}$
	F ..	+⅛	+⅛	$+\frac{3}{16}$	$+\frac{3}{16}$
ıckle opening before test........		$3\frac{3}{16}$	3⅛	3	$3\frac{1}{16}$
Defects of oupler after 3.—After each the nuckle—K, in—P, ank—S. ock—L, examined for cts.	1st blow, 10 ft ...	P. bent.	......	......	K. tight, P. bent.
	Knuckle opening.	2⅞	$2\frac{15}{16}$	$2\frac{13}{16}$	2⅞
	2d blow, 10 ft ...	K. opens ½ in. P. bent.	K. opens ½ in. P. and S. bent.	P. bent.	K. tight, P. bent.
	Knuckle opening.	$2\frac{13}{16}$	$2\frac{13}{16}$	$2\frac{11}{16}$	2¾
	3d blow, 10 ft ...	K. opens ¼ in. P. bent.	K. and L. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. and S. bent.
	Knuckle opening.	$2\frac{11}{16}$	$2\frac{11}{16}$	2⅝	2¾
	4th blow, 15 ft...	K. opens ¼ in. P. and S. bent.	K. and L. tight, P. and S. bent.	K. tight, P. and S. bent.	K. tight, P. bent. S. cracked.
	Knuckle opening.	$2\frac{9}{16}$	$2\frac{9}{16}$	2⅜	2⅝
	5th blow, 15 ft...	K. opens ¼ in. P. and S. bent.	K. and L. tight, P. and S. bent.	K. tight, P. bent, S. cracked.	Shank broke. ......
	Knuckle opening.	2½	$2\frac{7}{16}$	2¼	......
	6th blow, 15 ft...	K. tight, P. bent, S. cracked.	K. tight, P. and S. bent.	Shank broke.	....
	Knuckle opening.	2½	2⅜	......	......
ditional blows at 15 ft		1	1	......	......
al blows required to break.......		7	7	6	5

SUMMARY STATEMENT OF RESULTS OF TESTS OF M. C.-B. COUPLERS.

DROP TESTS.

Name of Coupler.	Number Tested.	Average Weights.		Number of Blows to Break and Where Broken and Cracked.												Average Blows Delivered.
				Coupler No. 1.			Coupler No. 2.			Coupler No. 3.			Coupler No. 4.			
		Couplers Complete.	Knuckles.	Blows.	Broken in	Cracked in	Blows.	Broken in	Cracked in	Blows.	Broken in	Cracked in	Blows.	Broken in	Cracked in	
American	4	225.3	52.4	15	knuckle		10	knuckle		15	knuckle		10	knuckle		12½
Brown's E. Link.	4	232.	36.1	6	knuckle		6	knuckle		7	knuckle		4	knuckle		5¾
Buckeye	4	229.8	56.3	10	shank	head	4	shank		5	shank		8	shank		6¾
California	4	225.3	33.9	13	knuckle		11	knuckle		13	knuckle		13	knuckle		12½
Chicago	4	221.5	53.3	21	head		20	head		12	knuckle		16	head		17¼
Drexel	4	205.8	57.8	10	knuckle		7	knuckle		10	knuckle		6	knuckle		8¼
Empire	4	203.	36.1	4	head		4	head		4	head		6	head	shank	4½
Gould	4	203.9	36.1	5	head		4	shank		5	head		5	shank		4¾
Hinson	4	223.5	52.8	9	knuckle	head	5	shank		9	shank	head	7	shank		7½
Janney	3	217.4	36.5	5	shank	head	4	shank		4	shank	head				4⅓
Johnson	4	183.1	36.1	5	shank	head	3	shank	head	3	shank		3	shank		3½
Ludlow	None															
*National	4	213.3	51.4	4	knuckle	shank	8	knuckle		6	knuckle		8	shank		6½
Rivers	4	254.1	80.3	1	head		2	head	shank	2	head	knuckle	2	head		1¾
Standard	4	225.5	67.	6	head		9	head		9	head		10	head		8½
St. Louis	4	217.	61.5	5	knuckle		5	knuckle		4	knuckle		5	knuckle		4¾
Thurmond	4	213.8	50.5	9	shank		3	shank		7	shank		2	shank		5¼
Trojan	4	219.3	51.8	3	shank		4	shank		4	shank	head	4	shank		3¾
United States	4	244.9	70.	20	Not broken		11	knuckle	shank	20	Not broken		14	knuckle		16¼
Williams	4	209.5	42.9	7	knuckle	shank	7	knuckle	head	6	shank		5	shank		6¼

*Formerly called "Perfected."

SUMMARY STATEMENT OF RESULTS OF TESTS OF M. C.-B. COUPLERS.

PULLING TESTS.

Name of Coupler.	Number Pairs Tested.	Average Weights.		Pull Required to Break.					Single Lug Test.	Drawbar Test.
		Couplers Complete.	Knuckles.	1st Pair.	2d Pair.	3d Pair.	4th Pair.	Average.		
American	4	224.9	52.3	146,300	157,400	156,800	153,300	153,450	135,000	219,900
Brown's E. Link	4	229.5	36.8	147,720	133,900	149,200	145,300	144,030	99,500	139,900
Buckeye	4	224.5	58.1	163,180	139,000	147,000	169,100	154,570	133,200	125,800
California	4	223.6	35.5	126,800	117,100	119,900	130,100	123,475	70,000	139,900
Chicago	4	219.1	53.3	195,200	169,700	185,600	171,100	180,400	154,600	209,500
Drexel	4	201.3	57.9	161,600	147,900	146,000	153,700	152,300	120,500	214,100
Empire	None	....	....	....	....	....	....	....	....	....
Gould	3	203.3	36.9	129,100	129,900	137,580	....	132,193	86,850	120,480
Hinson	4	218.7	54.4	125,000	138,200	112,400	124,400	125,000	98,700	135,100
Janney	4	215.4	37.4	91,300	84,150	93,400	92,800	90,413	71,400	135,200
Johnson	4	176.6	35.8	49,800	83,100	79,300	75,000	71,800	59,900	117,100
Ludlow	4	222.4	68.8	67,600	68,100	80,800	61,000	69,375	50,800	79,950
*National	4	213.7	49.9	135,400	155,400	128,300	168,600	146,925	127,100	224,900
Rivers	4	255.	82.1	61,300	143,400	129,000	141,200	118,725	119,200	....
Standard	4	221.9	66.5	149,400	164,800	153,100	164,500	157,950	106,000	....
St. Louis	4	211.9	61.2	134,000	123,700	146,500	124,000	132,050	116,100	135,700
Thurmond	4	205.1	50.8	145,000	131,900	106,100	137,500	130,125	107,600	112,100
Trojan	4	216.5	52.3	125,000	136,000	134,300	136,100	132,850	98,500	143,600
United States	4	243.5	70.6	108,000	133,800	116,000	148,800	126,650	137,100	226,800
Williams	None	....	....	....	....	....	....	....	....	....

*Formerly called "Perfected."

Mr. Marshall: I move that the report be accepted and the committee continued.

The motion was carried.

Mr. Waitt: I move that the Secretary be authorized to put the report in print and distribute it to the members of the Association for their use and information as soon as can conveniently be done, without waiting for the publishing of the annual report.

The motion was carried.

Mr. Adams: Mr. President, I move you that the Secretary be instructed to communicate with the Ordnance Department in regard to the drop-test machine at the arsenal at Watertown. I do not know exactly how to express it. Perhaps Mr. Rhodes can put it in proper shape.

Mr. Rhodes: I think Mr. Adams has got it in good shape. I would say further that it was stated at the Watertown Arsenal that if such a request came from the Master Car-Builders' Association there was a probability that it would meet with prompt action on the part of the authorities.

The motion was carried.

Mr. Marden: It has been remarked, you know, that there has been some backwardness among railroads and others in providing funds or time to give us the reports that we need. Now, this is one of the cases, in my opinion, where a committee, or two committees, have done a great deal of work for the benefit of the Association, and I think that the thanks of this Association are due to this committee for the very able report they have given us and the time they have spent upon it, and that we should encourage them in the work of the coming year. I think that in this connection the Pennsylvania Railroad should be mentioned also.

Mr. Adams: I second Mr. Marden's motion.

The motion was carried.

Mr. Leeds: This committee has been put to a great deal of personal expense, and I move that they be reimbursed for all personal expenses incurred on account of this test.

Mr. Marden: I second the motion.

Mr. Mackenzie: I would amend by saying—unless they have already been reimbursed by the railroad companies represented, which I think, is the case.

The President : There is no second to the amendment. You will vote upon the motion.

The motion was carried.

The President : The next in order is the eighth report, on Cast-Iron Wheels, which is a short report. Mr. West, the chairman of the committee, will proceed to read the report.

Mr. West : I would like to call the attention of the Association to the fact that there were over three hundred circulars of inquiry sent out and we received only twenty-five answers.

Mr. West then read the report, as follows:

REPORT OF COMMITTEE ON CAST-IRON WHEELS.

To the President and Members of the Master Car-Builders' Association :

The committee appointed on Cast-Iron Wheels, to investigate and report whether there is any substantial difference in wheels made by different methods, such as by solid chills or contracting chills, or by any other difference in process of manufacture, sent out a circular of inquiry, containing nine specific questions.

There were twenty-five replies in response to this circular, fifteen of which were from the heads of motive power departments of as many different railroads, and ten from wheel manufacturing companies.

The following are the questions, together with the answers received :

1. Have you ever practiced the manufacture of cast-iron wheels from the same iron, at the same time and in the same foundry in solid chills and in contracting chills ?

Answer.—There were fifteen answers. Six replied, yes; three replied, no; three replied, no experience; three, nothing to offer, and the others left the question unanswered.

2. If yes, which chill did you find most advantageous in foundry practice ?

Answer.—There were twelve answers. Five, decidedly in favor of the contracting chill; four, no data; one, very little difference in favor of the solid chill; two, no advantages in the contracting chill.

3. Have you had opportunities to compare the service of wheels made in solid chills with the service of wheels made in contracting chills ?

Answer.—There were twelve answers. Two had kept no records; two had no opportunities; eight answered, yes, decidedly, in favor of the contracting chill.

4. If yes, how does the service of the two compare as regards broken or cracked wheels ?

Answer.—There were ten answers. Seven, decidedly in favor of the contracting chill; one, no record; two, no advantages.

5. If yes, how does the service of the two compare as regards shelled out or soft places in the wheel treads ?

Answer.—There were eight answers. Seven, decidedly in favor of the contracting chill, and one, no record.

6. If yes, how does the service of the two compare as regards sharp or soft flanges?

Answer.—There were ten answers. Nine, decidedly in favor of the contracting chill, and one, no record.

7. If yes, how does the percentage of flat wheels which require to be replaced by the manufacturers compare as between wheels made in soft chills and contracting chills?

Answer.—There were nine answers. Seven, decidedly in favor of the contracting chill, and one, no record.

8. Have you noticed any less shelling out of wheels that were ground when new than when wheels are mounted without grinding?

Answer.—There was a uniformity of opinion that there was no advantage in grinding wheels.

9. In general, can you call attention to any improvement in the manufacture of cast-iron wheels that has come to your notice that would be of advantage to wheel makers and users?

Answer.—The only improvement that anyone had to offer was that of the contracting chill.

While representatives of three of our largest systems have failed to answer the question in detail, they have expressed themselves as decidedly in favor of the contracting chill, but for want of sufficient data have declined to answer questions.

From reliable data furnished by railroad companies and manufacturing companies which have kept accurate records, there appears to be a decided advantage in wheels made by the use of contracting chills. One of the largest roads in the country, which has been making wheels from the same iron at the same time in both chills, and which was in no way interested in any patents on contracting chills, says, that out of a total of 6,204 wheels, or 3,102 in each kind of chill, there was a percentage of loss of 5.35 per cent in the solid chill as against 0.61 per cent in the contracting chill. Another large manufacturer makes an almost similar report, and two of our most prominent master car-builders are very emphatic in their statements of decided advantages in the uniformity of chill, true diameter and freedom from soft places by using the contracting chill.

Respectfully submitted,

GEORGE W. WEST, Chairman,
W. H. THOMAS,
JOHN PLAYER,
Committee.

MIDDLETOWN, N. Y., June 1, 1893.

MR. WAITT: I move that the report be received and published in the Proceedings.

MR. MITCHELL: I would like to ask if all these answers that were received to the circular letter, which favored the contracting chill, were not from roads that used the contracting chill entirely.

MR. WEST: No; there were not more than two that adopted the contracting chill entirely. Most of them were using the contracting and the old solid chill.

Mr. Barnes: I would like to ask what is meant by the contracting chill. There are several forms of subdivided chills that are often called contracting chills, while there is only one chill that is properly called the contracting chill, and that is the Barr contracting chill. A matter forgotten entirely is the great improvement from rapid pouring. The great improvement in chills is very largely due to that.

Mr. West: Our replies were confined almost entirely to the Whitney and the Barr contracting chill. I would like to say that that was one of the points raised by the majority of the answers, that the contracting chill allowed of a hotter and more rapid pouring of the iron.

The President: If there is nothing further in regard to this report, as it is about 12 o'clock now, we will take up special subjects. Mr. Adams, I believe, has something to offer on special subjects.

Mr. Adams: If there is nothing else to come before the convention at this hour of noon, I have a communication that I would like to read which I think would be interesting to the members:

> We have with us today one of the original members of this Association — Mr. David H. Baker—Master Car-Builder of the Pennsylvania Railroad Co., at Jersey City, whose services in connection with the early developments of car construction antedates the birth of the majority of our members.
>
> Born June 22, 1811, Mr. Baker began his career as a car builder in 1834 on the Mohawk & Hudson Railroad. In 1835 he went to the Utica & Schenectady Railroad and there remained until 1849, when he accepted the position of Master Car-Builder of the Jersey City shops of the New Jersey Railroad & Transportation Company. His attention and devotion to his duties have been beyond parallel in our railroad history.
>
> For forty-four consecutive years he has filled the position of Master Car-Builder of those shops in the continuous service of the New Jersey Railroad & Transportation Company, the United Railroads of New Jersey and the Pennsylvania Railroad Company.
>
> Since 1835 he has never lost a day from his duties, except a few weeks of well-earned vacation, and for the past thirty-eight years has drawn his pay uninterruptedly, a case we believe unparalleled in the railroad service of the United States; we therefore
>
> *Resolve*, That in view of the long and valuable services rendered by Mr. David H. Baker to the car-building interests of this country, his noble example of faithful and devoted attention to his duties, we recognize in him the true type of a Master Car-Builder and railroad man, who, in his way, has assisted the progress of the age; and be it further

Resolved, That in view of such services and such record, he be made an honorary member of this Association for the balance of his days, without any further dues or assessments, and we hope that he may be spared to meet with us as an Association for many years to come.

Resolved further, That these resolutions be entered upon the minutes, and a copy of same be presented to Mr. Baker.

(Applause.)

MR. CLOUD: I might say that Mr. Baker has been considered an honorary member of the Association, in so far as there could be such a membership, for many years, by direction of the Executive Committee. I think the adoption of this resolution and spreading it upon the minutes and furnishing a copy to Mr. Baker would be about all that the convention could do in addition to what has been done.

MR. MARSHALL: I move that the resolutions be adopted.

MR. BISSELL: I second the motion.

The resolutions were adopted.

MR. MITCHELL: Mr. President, I would like to hear from Mr. Baker.

MR. BAKER: Gentlemen, it is somewhat difficult for me to make a speech. It is something I have never done in my lifetime. But I certainly thank the convention for the kindness and consideration that they have shown me. (Applause.)

THE PRESIDENT: Have any members anything further to offer for the noon hour discussion? If not, we will proceed with the report of the next committee. The next report is the ninth on the list—Steel-Tired Wheels, which is also a short report. Mr. Marshall will read it.

MR. MARSHALL: You will not find the Paige wheel given in this statement for the reason that we did not receive a reply from them until after our report had been completed, and then it did not answer all of our questions.

Mr. Marshall then read the following report:

REPORT OF THE COMMITTEE ON STEEL-TIRED WHEELS.

To the President and Members of the Master Car-Builders' Association:

Your committee having found it impossible, last year, to obtain sufficiently full and positive information, in reply to its circulars of inquiry, to form accurate comparative statements as to the performance of the various types of steel-tired wheel centers in use in the country, has, this year, confined itself to asking for information of a more general character.

The information contained in the replies received has been tabulated and is shown in the following three statements, the first of which shows the expression of preference of the members of the Association for the various types of centers; the second, their expression of opinion as to whether spoke wheels are objectionable for use under passenger equipment cars; and the third, the approximate weight and price of the various types of steel-tired wheels now in the market. The figures given in the latter statement are all for 33-inch wheels with tires 2½ inches thick, except in the case of the "Thurber" wheel, manufactured by the Brooks Locomotive Works, which is quoted with 2¼-inch tire.

TYPE OF CENTER.	Preferred by		REMARKS.
	Number of Members.	Passenger Cars Represented.	
Bolted	10	1616	
Solid Wrought	13	6036	Spoke Centers preferred by 2 members representing 578 cars. Disk Centers preferred by 7 members representing 1610 cars. No preference expressed by 4 members representing 3848 cars.
Solid Cast	5	1056	All prefer the Plate Centers.
No preference expressed	7	1964	
Total replies	35	10672	

SPOKE WHEELS.

OBJECTIONS.	Raising Dust.	Noise.	Hard to Clean.	Rim Springing.	Various Reasons.	Total Objections	No Objections.	No Opinion Expressed.	Total Replies.
Number of Members	11	1	2	1	1	16	12	7	35
Passeng'r Cars represented	1689	73	600	332	485	3179	2300	5193	10672

Manufacturers or Agents.	Designation of Wheel.	Weight.	Price.
BOLTED CENTERS.			
Allen Paper Car Wheel Co., Chicago, Ill.	Paper Center No. 1.	775	$52.00
Brooks Locomotive Works, Dunkirk, N. Y.	Thurber	796	57.50

Manufacturers or Agents.	Designation of Wheel.	Weight.	Price.
CAST CENTERS—PLATE.			
Allen Paper Car Wheel Co., Chicago, Ill.	C. I. Dbl. Plate Spoke, No. 9.	775	47.00
Allen Paper Car Wheel Co., Chicago, Ill.	C. I. Dbl. Plate Spoke, No. 11.	775	50.00
Allen Paper Car Wheel Co., Chicago, Ill.	Cloud Boltless	775	47.00
A. Whitney & Sons, Philadelphia, Pa.		850 to 900	45.00
Ramapo Wheel and Foundry Co., Ramapo, N. Y.	Snow Boltless	912	48.00
McKee, Fuller & Co., Catasauqua, Pa.			
Taylor Iron & Steel Co., High Bridge, N. J.		785	37.00
CAST CENTERS—SPOKE.			
Allen Paper Car Wheel Co., Chicago, Ill.	C. I. Spoke, No. 7.	775	47.00
Allen Paper Car Wheel Co., Chicago, Ill.	Cloud Boltless	775	47.00
A. Whitney & Son, Philadelphia, Pa.		850 to 900	45.00
Ramapo Wheel and Foundry Co., Ramapo, N. Y.	Cast Spoke.	912	48.00
McKee, Fuller & Co., Catasauqua, Pa.			
Taylor Iron and Steel Co., High Bridge, N. J.		785	37.00
WROUGHT CENTERS—DISK.			
Page, Newell & Co., Boston, Mass.	Brunswick	670	48.00
Thos. Prosser & Son, New York, N. Y.	Krupp, No. 1	800	57.00
Boies Steel Wheel Co., Scranton, Pa.	Boies, W. I., Center No. 2	800	48.00
Chas. G. Eckstein & Co., New York, N. Y.	Arbell	675 to 725	44.00 to 46.00
WROUGHT CENTERS—SPOKE.			
Page, Newell & Co., Boston, Mass.	Brunswick	670	48.00
Chas. G. Eckstein & Co., New York, N. Y.	Arbel	675 to 725	44.00 to 46.00
Standard Steel Works, Philadelphia, Pa.	Vauclaine	680 to 700	45.00
Philip S. Justice & Co., Philadelphia, Pa.	Owen & Dyson	725	45.00
Steel Truss Car Wheel Co., St. Louis, Mo	Steel Truss Wheel.	760	50.00

Respectfully submitted,

R. E. MARSHALL,
J. O. PATTEE,
C. H. CORY,
Committee.

PHILADELPHIA, Pa., May 13, 1893.

Mr. Sanderson: I move that the report be accepted and printed in the Proceedings, and that the committee be discharged.

Mr. Mitchell: I would prefer to see this committee continued another year until they can get information on the Paige wheel, and place it in with this circular. The Paige wheel is used very extensively throughout the country and is giving good service, and I presume there are as many of those wheels, at least, in use in this country as of any other wheel, unless it may be the Allen, and I think that the information relative to that wheel should also be printed in the report.

The President: You can vote this motion down and make a new one.

The question was taken upon Mr. Sanderson's motion, but the result being in doubt, the President called for a rising vote.

Mr. Adams: I want to make a suggestion in regard to the duties of the committee.

The President: I suppose the committee will know its duties.

Mr. Adams: Then I will put it in a different form. I would like the Association to instruct the committee to get certain information.

The President: We can do it after we finish this vote.

The rising vote was then taken, and the motion was lost.

Mr. Mitchell: I would move that the committee be continued another year, and that they embrace all steel-tired wheels in the market.

The motion was seconded.

Mr. Rhodes: Some of the members would like to discuss this question a little bit, and I think sometimes it puts a committee in an unfair position to be continued without very much discussion to indicate what the object of the convention is in continuing them. Mr. Mitchell has explained why he wishes the committee continued, and Mr. Adams started in at the wrong time to say something about why he wanted the committee continued. Now, I would suggest that if any members have anything to say to this committee that they say it now.

Mr. Bissell: I think that the vital points we want are not embodied in this report. I think we want the wearing quality and the durability of these wheels, the liability to accident and their relative safety. And then, there are so many differently formed wheels.

Some have a center that is indestructible and some have a center that will burn up, and it seems to me the most desirable wheel, the most durable wheel, the wheel that gives the best service and is the most safe, should be included. With regard to the weight of the wheel and the cost of it, of course there may be many considerations. But it seems to me that the principal question we want brought out, and that the railroads want brought out, is which is the most desirable wheel, the most economical wheel and the safest wheel to use.

MR. MARSHALL: I would like to say in answer to what Mr. Bissell has stated, that last year the committee began its investigation on the lines that he speaks of, but found it impossible to get information to enable it to make a satisfactory report in regard to the matter, as it seemed that the majority of the railroads of the country kept their record of steel-tired wheels to show almost entirely the wear of the tires and with very little relation to the various types of centers; and I think that if the committee should take it up again they would find the same state of affairs that they did then. The committee would be very thankful for any suggestions that would enable them to get that information without making a test themselves—which, of course, would not be feasible and would go over a good many years. If the committee is to be continued to do that we would be very thankful for any suggestions.

MR. ADAMS: I was going to suggest to the Association to instruct the committee that, as it occurred to me, what would be desirable for the Association would be not only the comparative value of the wheels with respect to each other, but the relation of one wheel to another wheel, the percentage of breakage of the different wheels, both tire and center, if you please, and the comparative mileage of wheels of different classes and the kind of tire that is used to produce this mileage. Those questions are the important ones, if I understand anything about the steel wheel business. I understand, at the same time, that it would be perhaps a difficult thing to get this information, because a good many roads are not prepared to give it; yet I think there are some roads that would give a tolerably correct answer to all of these questions. I think I could answer some of them pretty correctly. I could not answer them all, perhaps. Our road is universally known to be using steel-tired wheels and to have used them perhaps longer than any other road in this country. We have used them for twenty-three years almost exclusively under our passenger and engine equipment. We have used a great number of kinds of steel wheels and we could give some comparison between the service of these wheels. I do not know that it is always desirable to do that, however. It might be too personal. But they could be classified under numbers so that the name might not be known. I do not like to make comparisons between persons' products very much.

MR. BISSELL: How are we going to get the benefit of it?

MR. ADAMS: That is a thing that has bothered me a little to explain.

MR. BISSELL: They mentioned the Barr chill, and I do not see why the Paige wheel should not be mentioned. I do not think there should be any objection to mentioning the names of the wheels at all. I do not think myself, from my experience, that the center is a very important factor in a wheel. We have had no trouble with any wheel. I am willing to concede that if a paper wheel got into a severe fire the center would be destroyed, while a cast-iron center would probably not be destroyed. That would be the only objection to the center. I think these questions are very important and if this information could be obtained pretty correctly and carefully it would be a very important thing to the Association, and if the Association would so instruct the committee, and the members that have the information would be willing to extend it, it would be a good deal of benefit.

MR. RHODES: I believe that the points that Mr. Bissell and Mr. Adams have made are quite important ones, but I do not believe that I draw those conclusions from the same reasons that they do. I think it is the general impression that a steel-tired wheel is a very safe thing and a very good thing to use. Now, I am not of that opinion at all. The experiments that we have made and the experience we have had with steel-tired wheels do not lead us to draw the conclusion that they are the best wheels to use, and it is partly on that account that I wanted to endeavor to excite a little discussion on this matter. We know that in the matter of shoes there has been quite an effort made, and a successful effort, to dress down the parts of the steel tires which do not come in contact with the rail, and an effort is made not to use steel on the parts that do come in contact with the rail. Now, where we use steel-tired wheels we do get steel in contact with the rail all the time, and it is the experience, I believe, on a good many of the Western roads, and especially on the hilly roads, that where they largely introduce steel-tired wheels the rail wear is very materially affected. In fact, I know of several lines where they have been obliged to abandon the use of steel-tired wheels on account of the excessive wear of the flange of the wheel. My attention was called recently to a case of excessive rail wear on a line which has a good many curves. Formerly the rails used to last on those curves about five years. At the present time they are lasting two years. It got to be quite a serious question on that road, and the endeavor was made to account for it. While it is true that the loads had increased, it is also true that the steel-tired wheels passing over that track had very materially increased in number, and those of you who know the action of the sleeping car companies recently in reducing the diameter of their wheels must know there is some cause for it. The cause for it was that the flange would not wear sufficiently well. You are constantly having to turn tires, not for tread wear, but for flange wear. Now the palace car companies have changed the diameter of the wheels, not because they are wearing out your rails, but because the flanges are wearing out. It is fair to assume that the same proportion of wear went on with the rail that went on with the flange. I have heard one gentleman state outside of the convention that going along his line he found large strips of rail cut off by some of the wheels of his road. I do not mean by that a long strip, I suppose it was merely a sort of scale cut off. I have no doubt there are many here who if they care to speak about it could mention that they have tried it and have done away with the steel-tired wheels and put back iron wheels. In these days when we are looking after our expenses very closely at all points, I think that it will pay us well to look after our wheels, and that the endeavor should be to raise the value, increase the service of our cast-iron wheels, and not necessarily to jump to the conclusion that the steel-tired wheel is the best thing. I thought that some steel-tired wheels mounted on centers would never break. Our last year's experience was that wheels with wrought-iron centers broke as often as cast-iron wheels — not quite as fast, because we do not have quite as many wrought center wheels as cast-iron wheels. But my idea that we were going to get a wrought center wheel that was going to last forever has disappeared entirely. They are not going to last forever, and it is a serious question whether we ought to pay $40 or $50 for them when we can buy a wheel that will give a large mileage for $8 or $9.

MR. BISSELL: I would like to inquire if, where this rail was sheared off, they used a flange brake shoe. My experience is that by using a brake shoe that fits over the flange of the wheel that difficulty is avoided. In the last seven years we have been using that flange brake shoe, and we never have found a pair of wheels coming in where that was used continuously that was in a condition to shear off the edge of the rail. With regard to Mr. Rhodes' remarks, although they are pertinent in a certain direction, they are not pertinent to this question. The question is the best steel-tired wheel. It is not whether the steel-tired wheel is better than some other wheel. My experience with steel-tired wheels, I think, has been as extensive, perhaps, as that of anyone in the room. I happened to be with the Pullman Company at the time they adopted the steel wheel, and I put those wheels on a great portion of their equipment, and since I have been with the Wagner company we have adopted them entirely. The question is to bring out the best steel-tired wheel. My private opinion is about the same as Mr. Rhodes' with respect to cast and steel wheels. I know that within a week we have had a tire break on a new steel wheel — a new wheel that had not run but a trip or two. But as the railroad companies have adopted the steel wheel they will use them, whatever our private opinions may be. Our purpose ought to be to get at the steel wheel that will produce the best results and that will be the most economical and the safest wheel.

Mr. Waitt: Mr. Adams, a few moments ago, made one remark in connection with the steel-tired wheel with which I think there are quite a number of us who will hardly agree. That was that the centers were not a matter of any great consequence — that it did not make much difference what kind of center the wheels have. My own opinion is that a great many of these cases, such as Mr. Bissell has just spoken of, of a new steel-tired wheel breaking, are due to something being wrong about the center, or that the tire which is put on the center is not backed up when strains and the pressure of the load come upon it, to keep it from such strains as will break it. I know that in our own experience we have wheel after wheel taken out from the cars, on account of bolts loose or bolts partially sheared. When I find that steel-tired wheels are being removed from cars because the tire has been revolving on the center, not being held properly in place; when steel-tired wheels are taken out because the heating of the tire by the application of the brakes has injured the center so that it does not back up the tire — all those things make me believe that there is a great deal in the proper kind of a center; especially, too, when I have my attention called to the fact, as I have had within a few weeks, that a road which has had experience with a large number of wheels—some 14,000—of a certain kind of center, had not, I believe in some eight years' service, a single failure. We have not had any experience of that kind. The road that I refer to is using an entirely different center. The tires they are using are similar to what we are using and what other roads are using. I believe when we view such facts as those we must conclude that there is something in the kind of center that is used, and I believe that if the committee in its investigation were to develop by inquiry what failures are due to defects in the tire or within the tire, and what are due to peculiarities in the center, it would develop a very interesting state of things. I believe that it would develop the fact that there is quite a difference in the kind of centers used on steel-tired wheels. I trust that the committee as continued during the coming year will take up that feature as to failures that are due to the center or attributable to the tire.

MR. ADAMS: Will Mr. Waitt tell us what kind of a wheel and whose wheel that was that has such a good center?

MR. WAITT: I would not feel at liberty to give it publicly in the meeting without the consent of the road that gave the information.

MR. ADAMS: It certainly would be to the credit of the gentleman who made the wheels.

MR. WAITT: It is a similar wheel—only it has differences—to one that Mr. Adams has tried very extensively.

MR. ADAMS: I would like to say, Mr. President, that while we have used steel wheels a very long time, Mr. Bissell has probably had a great many more in use than we have had. We have had various kinds of steel wheels in use. As I stated before, I do not think the center enters into it so much as the kind of tire you use and the various other things that are connected with it. Mr. Waitt alludes to the tire breaking, on account of the lack of backing, when the wheels were comparatively new. Mr. Bissell spoke of a wheel breaking when it was new. That could be easily accounted for by too great a shrinkage of the tire, and when the blows began to pound upon it the strain was too great. Of course, everybody knows very well if you are going to fit up a driving wheel you want to get the shrinkage just right. If you get it too great you will burst your tire. I never have had in our experience any serious accident from the breakage of a steel tire during the whole time that we have used them—some twenty-three or twenty-four years. I do not say we have not had them break. But I say we have never had an accident resulting from it. That is one feature of steel wheels that makes them preferable to iron. If there is a defect in them it will always be discovered by proper inspection before they fail; while with a cast-iron wheel that is not so. A cast-iron wheel may break very suddenly without any appearance of defect at all. I understand perfectly well, and everybody else, of course, knows the fact to be, that in heavy graded roads, running down long inclines, the application of the brakes for any considerable time will elongate the tire. It will heat it up to an extent that it will expand, and consequently loosen to a certain degree; and if it is a bolted wheel the chances are that it will shear the bolt. While if you have a wheel with a different fastening from that, where there are no bolts to hold the tire, it would not be subject to that objection. It might be loosened and moved on the center, but as soon as the shrinkage comes on again, it tightens. It tightens as soon as it cools and it will be just as tight as it was before. We never have seen any difficulty with that. We have had very good success with wheels where the tire was welded on. Mr. Rhodes spoke, I think, about iron wheels being the cheaper wheels to use. I should differ with him in regard to that a good deal. We have estimated it a great many times and it has been gone over by our general officers carefully. They require us to be very careful and economical in our expenditures, and if we make mistakes they find them out pretty quickly; and they have made up their minds completely and fully that the steel-tired wheel was very much cheaper for us to use if the cars made two hundred miles a day. If you reduce the mileage of your cars the interest will soon eat up the saving, and it is not economy to use a steel wheel under a car that makes a small mileage. But when you run up a car to two hundred miles or more a day, the steel wheel is very much the cheapest wheel to use, according to our experience.

Mr. Barnes: I would like to move that the committee be instructed to report next year on the number of parts, the weight of tire, the weight of center, the method of fastening illustrated by drawings, the liability of the tire and parts to get loose, and to describe the process of re-tiring, with respect to the wheels mentioned in the report and such additional wheels as are on the market.

The President: There is already one motion before the meeting now which we are discussing.

Mr. Barnes: I move that as an amendment to the original motion.

Mr. Lewis: I second the amendment.

Mr. West: We have at our Middletown shops today seventy-five failed steel-tired wheels and only two of them are from defective tire or tire failure. The rest of them are all centers.

Mr. Marshall: There seems to be some misapprehension among some of the members as to the original instructions to the committee. I see they are not shown on the list of committees as given in the programme this year. The instructions were to investigate the relative merits of the different types of centers for steel-tired wheels without any relation at all to the tires. Therefore there is nothing included in their duties as to the wear of the tires; and we found, of course, the first year when we attempted to get information as to failures in service, etc., that nearly all the records kept by the railroads relate to tire wear and the defects of tires, and we were not able to get information, except from a few roads, as to relative merits and the results obtained on the different types of centers. If this committee is to be continued, I hope some of the gentlemen who have had so much experience with steel-tired wheels will be added to the committee. They might be a valuable addition to it. Very few of us on the committee have had much experience with steel-tired wheels. Mr. Pattee, who has probably had the most experience, is in the far West.

The President: The Secretary will read the motion as amended.

Mr. Cloud: It is that the committee be continued another year; to embrace all steel-tired wheels in use and to report the number of parts, weight of tire, weight of center, method of tire fastening illustrated by drawings, liability of the tire and parts to get loose and to describe a process of re-tiring.

Mr. Hayward: Allow me to suggest that the committee should include in that the limit of wear on tires. There is a great difference in the strength of those tires by reason of the method of construction and the method of application. In our interchange of cars, and particularly of cars coming a long distance—Pullman cars especially—the question very often comes up between different roads interested as to what limit of wear should be considered safe under such cars.

The President: If the mover and seconder have no objection we will add that to the motion.

The motion was then put and carried.

Mr. Cloud: The Association has not yet accepted this report and instructed that it be printed in the proceedings. I would like to know what is to be done in that regard.

Mr. Waitt: I would move that the report be received and printed.

The motion was carried.

Mr. Cloud: I would further like to state in this connection that we have to send out a great many circulars of inquiry to different committees. They are mailed to every member of the Association, and the chairmen of a number of committees have asked me whether I have sent circulars to such and such parties. They complain that they have had no reply. It was so, I believe, with this committee, as well as many others — that they did not get replies to the circular of inquiry to enable them to make the report which they should make.

Mr. Mitchell: I think that has been a common complaint of all committees, and in order to bring it before the convention I would move that it is the sense of this convention that all members should give careful attention to answering circulars of inquiry from committees appointed to investigate subjects.

The motion was carried.

Mr. Sanderson: I would like to move that three additional members be added to this committee for the coming year.

The President: Making the committee six?

Mr. Sanderson: Yes.

The motion was carried.

Mr. Cloud: I understand that the Committee on Nominations is ready to make its report.

Mr. Day presented the following report from the Nominating Committee:

Names selected by Committee on Nominations, to be presented to the convention to be voted for to serve for the next ensuing term as follows, namely: For president, Mr. E. W. Grieves; for first vice-president, Mr. J. S. Lentz; for second vice-president, Mr. S. A. Crone; for third vice-president, Mr. T A. Bissell; for treasurer, Mr. G. W. Demarest. For Executive Committee, to serve two years, Mr. R. C. Blackall, Mr. J. C. Barber, Mr. J. M. Wallis. By the committee.

MR. CLOUD: According to the Constitution this will come up for consideration tomorrow.

THE PRESIDENT: We have four committees left on our list. From one of them, I am under the impression that we will not get any report; that is, the report on Steam Heating and Ventilation of Passenger Cars. Is it your desire that we continue our business today and take up the balance of these committees?

MR. ADAMS: I move that we adjourn.

MR. BLACKALL: I move that the Committee on Steam Heating be discharged and a new committee appointed. It has been in existence two years without making any report.

THE PRESIDENT: There has been a motion made to adjourn, Mr. Blackall. Will you reserve that till tomorrow?

MR. DAY: I do not think the motion to adjourn has been seconded.

MR. ADAMS: Yes, Mr. Kirby seconded it.

MR. DAY: Well I make this motion that the rules be suspended as to the regular meetings laid down in the By-Laws and that we call a meeting for this afternoon to finish up this business. Tomorrow, possibly, we might not get through again, and there are some that want to go away tomorrow morning. It appears to me that while we have them here we had better make use of them in some way, and I think we might put ourselves to a little trouble and meet again this afternoon for, say, two hours, and discuss such matters as may properly be brought before the convention. I would move that we hold a meeting this afternoon.

The motion was seconded.

THE PRESIDENT: A motion to adjourn has been made and seconded. I will have to put that motion.

The motion to adjourn was carried.

FOURTH SESSION.

The convention was called to order on Friday, June 16, at 9:25 A.M.

THE PRESIDENT: The Secretary has some announcements to make.

MR. CLOUD: I have an answer to the message sent to Mr. Haines yesterday. It reads as follows:

> The Railway Safety Appliance Act authorized the American Railway Association to fix the standard height of drawbars for cars in use, and the Association fixed height at 34½ inches, assuming that the standard height for shop drawings would be fixed with due allowance for settling to 34½ inches after a car was put in use.

THE PRESIDENT: Do you want to take any action on the message?

MR. MITCHELL: Yesterday, I believe, we took some action on the height of drawbars. I move that we reconsider our action of yesterday and take up this subject of the new height of drawbars above the rail. Evidently this means that 34½ inches will be the height after the car has run some time, when empty. Therefore, the minimum height would be increased over 31½ inches.

MR. CLOUD: I would say for Mr. Mitchell's information that the matter is in good shape, and it seems almost unnecessary for us to discuss what we will do about a standard that is going to be fixed by the United States government. The announcement will be made officially by the government what the standard shall be. After that announcement comes out we will know what to do, and the instructions to the Secretary to send out a letter ballot will be perfectly explicit.

The following telegram has been received:

> Please have your convention appoint a committee to attend the next meeting of the American Society of Railway Superintendents. Letter follows.
>
> C. A. HAMMOND, Secretary.

MR. MARSHALL: I move that that be referred to the Executive Committee for action.

The motion was carried.

MR. CLOUD: I have a letter from Mr. W. E. Griggs, Receiver and Manager of the Chautauqua Lake Railway, which says:

> The Chautauqua Lake Railway hereby tenders to the Master Car-Builders' Association, during their convention at Lakewood, June 12 to 19, the free use of all trains

running between Jamestown and Chautauqua, and hopes to be favored with their gracious presence, either collectively as an Association or individually as members.

I have not yet acknowledged this letter, but will do so at once thanking them for it and saying that we cannot accept the invitation collectively, but that some of the members will make use of the privilege offered — unless the Association directs otherwise.

THE PRESIDENT: If the Association is satisfied with the statement, we will proceed to the consideration of the reports. We will now take up and finish Report No. 4 — Protection of Trainmen and Lettering of Fast Freight Line Cars. There was a sub-committee appointed to consider this matter.

MR. LEEDS: Mr. President, our report on that subject is in the hands of the secretary and I would be pleased if he would read it for us.

Mr. Cloud read the following report:

REPORT OF SUB-COMMITTEE ON PROTECTION OF TRAINMEN FROM ACCIDENT, AND LETTERING FAST FREIGHT LINE CARS.

The committee appointed to report on the report submitted June 15 on same subject, reports:

It has considered the report submitted and recommends as follows:

First.—That both subjects be included under the head of recommended practice in conformity with the suggestions of the committee of 1892 on Standards of the Association.

Second.—That the material under the head of "Protection of Trainmen from Accident" be modified as follows (with reference to present standards):

Omit the last paragraph on page 282 of report of 1892, which reads:

"That the small platform placed at one end of freight cars to fasten the brake pawl to, etc., be discontinued, the ratchet wheel and pawl to be fastened to a suitable casting on the roof."

The first portion of this paragraph seems to be of a negative character as recommended practice, and the balance of the paragraph is superfluous because it is treated in the paragraph preceding it, which we do not propose to alter.

Under "Running Boards" we recommend the following wording:

"The ends of the running boards of box cars to be made to project over ends of cars and properly supported, so that the minimum distance between the ends of those adjoining cars will not be less than twelve inches, and that the running boards be made not less than two feet wide."

Under "Steps" we suggest to leave the first paragraph as it now is and to place the second paragraph under "Ladder and Handholds," with some alterations.

Under "Ladder and Handholds" we suggest the whole matter be altered to read as follows: "Each box and stock car should have two iron or wooden ladders, with not less than five steps to each ladder; the steps to be not less than 3½ inches from side or end of car; each ladder to have a handhold on the roof, directly over top of ladder. When iron ladders are used and placed on ends of car, the bottom step to have a guard or projection to prevent men from slipping when swinging around the end of car to get on the step.

"When the ladder is placed on the ends of car a handhold should be placed on opposite side of the end of the car from the ladder, and when ladder is on sides of car, two such handles should be placed on each end of the car, about twenty-four inches above the bottom of the sill.

"On all freight cars which are not equipped with ladders (such as flat cars), two handholds should be attached to each end sill. Handholds on end sills should have at least 2 inches clearance behind them, and all other handholds should have at least 2½ inches clearance behind them.

"All handholds should be made of iron not less than ⅝ inch diameter; and handholds on sides and ends of cars should be at least 2 feet long in the clear. Those on end sills to be made shorter only when it is impossible to use this length."

Third.—Under the head of "Lettering and Numbering Fast Freight Line Cars," this committee concurs with the report submitted to it, namely, that paragraph No. 2 reading, "Doors should have no marks whatever," be stricken out and in its stead the following inserted, "Side doors to bear the initials of the road to which the car belongs, or the name of the line on which the car is used, together with the number of the car." (Signed)

P. LEEDS,
S. IRVIN,
T. SUTHERLAND,
R. H. SOULE.

MR. MARSHALL: I move that the recommendations of the committee be submitted to letter ballot.

MR. RHODES: I second the motion.

MR. MITCHELL: I would like to ask what the decision was, where the uncoupling lever passes over from one side of the car to the coupler—whether the handhold would be required on that side of the end-sill on flat cars. I do not see where the handhold can be put when the uncoupling lever is in place.

MR. LEEDS: It was in consideration of that same matter that we left the wording of that as it is. We found that handholds could be placed with two inches clearance behind them, on the end of a flat car and not project any more than the nuts and washers of truss rods. On cars that have say six truss rods, if you place the handholds in the center of the sill or in fact almost anywhere on it, in reaching over that you would strike the nuts and washers of truss rods. There is nothing to prevent anyone from using the uncoupling rod that extends across the sill if they will recess back of it enough to allow of a two-inch clearance. I do not see that anybody objects to their using that. But at the same time any uncoupling device that I have seen yet does not give clearance enough to get the hands back of this rod unless they recess this clearance. That was the reason that the clearance was given and the location of the handholds was left entirely optional with everybody. It is a matter of judgment whether they place them on the end-sill or whether they place them above so as to have a recess in the ends of the floor, or whether they recess behind the uncoupling device.

Mr. Mitchell: I move that that should be included then in the recommended practice, that where the uncoupling device can be utilized as a handhold that it can be so used, but where the uncoupling lever cannot be used for a handhold that two handholds be placed on each end sill.

Mr. Marshall: I will accept that amendment.

Mr. Rhodes: I will accept it.

The President: The motion then would stand that we submit the committee's report to letter ballot with Mr. Mitchell's amendment, as that has been accepted.

Mr. Hennessey: That is simply on that one subject of the handhold.

The President: Yes, and the lettering — the Committee's report of yesterday.

Mr. Hennessey: There is another point in that. I notice that the committee recommends doing away with the platforms on the ends of cars. I think there are some cars where it is necessary to have the platforms on the ends of the cars.

Mr. Cloud: What platform do you refer to—above the flooring, away up toward the roof — a little step?

Mr. Hennessey: Yes.

Mr. Cloud: The old standard reads: "That the small platform placed at one end of freight cars to fasten the brake pawl, etc., be discontinued." Now this is to be recommended practice, and the committee tried to express the idea that they did not want to recommend a practice which was to abandon a practice. It does not change the practice and it does not change the intent.

The motion was carried.

The President: There was a special committee on Metal for

Brake Shoes and Brake Shoe Tests. Will Mr. Marshall read his report:

Mr. Marshall read the following report:

REPORT OF COMMITTEE ON METAL FOR BRAKE SHOES AND BRAKE SHOE TESTS.

The committee reports as follows:

The importance of a complete and thorough test of brake shoes will become manifest to anyone who peruses the data on the consumption of shoes presented by the Secretary in his very valuable report. After fully considering the subject and consulting with those interested in the question, the committee is well satisfied that, not only are the tests perfectly feasible, but that with a little coöperation on the part of the railroads both *road test investigations* and *shop or laboratory investigations* in complete detail can be presented to the next annual convention at but very little cost to the Association.

To carry this out the committee would propose:

First.—To conduct the *road tests:* The appointment by the Executive Committee of a committee of not less than twelve members from an equal number of railroads in different sections of the country who shall have signified their willingness to participate in the tests.

It is deemed important that a large committee should be named in order to have a representative of the committee to superintend the road tests while in progress on each line.

A committee of three from this general committee of twelve to be named, who shall frame out the work of the committee, namely, provide brake shoes, scheme out a line of tests to be followed and sum up the results. It is obvious that to get any results from these road tests the work must be taken in hand at once.

Second.—To conduct the shop or laboratory tests: The appointment of a separate and distinct committee of three from either associate, active or representative membership. It is believed that arrangements could be made with the Perdue University, for all friction tests with shoes of different metals against *steel-tired wheels* and possibly also against *cast-iron wheels.* If the latter is not practicable at the University, arrangements without doubt could be made in connection with some of the Mechanical exhibits at the World's Fair.

It is thought by the committee that these tests can be carried out with very little expense to the Association, but in order to provide for any emergency which may arise, it is recommended that the Executive Committee be authorized to expend on account of these tests a sum not exceeding $500.

Respectfully submitted,
R. E. MARSHALL,
G. W. RHODES,
R. P. C. SANDERSON.

MR. LEWIS: I move that the report be received.

The motion was carried.

MR. RHODES: I move that the report be referred to the Executive Committee for action, and in connection with the report I see that the committee gave the matter a great deal of attention and did not confine the subject to themselves but discussed the matter with many of the members, and when the committee is appointed the present committee can turn over to such committee as may be appointed a pretty complete form of tests for the road tests. In consulting with some of the members who are familiar with the professors and management of the Purdue University, we have ascertained that there is hardly any doubt but that the Purdue University would be very glad to carry out these friction tests for us, and in ample time to present them at the next annual convention. The only question of expense that will probably come up at the Purdue University will be the expense of fuel to run the engine, and possibly some other minor expenses. In discussing the matter of brake shoes, we believe that those interested in brake shoes will furnish the shoes at very little cost, if any. It has further been intimated to the committee that some of the brake companies that are interested in this question just as much as the railroads are will give their cordial coöperation and support. At first the committee proposed to recommend the expenditure of rather a large sum, and we talked of $2,000, but we finally narrowed the thing down to $500. We do not expect that $500 will be spent. We expect that the Association will be able to carry the work out at a very little expense — it will be under $500 anyway. Whatever committee has the matter in hand must bear in mind that the road test must be started at once to get any data for the next annual convention. The tests ought to be started in a couple of months anyway.

The motion was seconded.

THE PRESIDENT: I understand Mr. Rhodes' motion to include the expenditure — $500.

MR. RHODES: Yes, sir.

THE PRESIDENT: It has been moved and seconded that the report of the committee be referred to the Executive Committee for action, with authority to expend $500, if necessary.

The motion was carried.

MR. MARSHALL: I would like to say now, if it is decided to carry out those tests, that I think it would facilitate the matter very much and get it in shape at an earlier date, if the members who are interested would see that the Executive Committee are advised that their roads are willing to participate in the road test. In that way it will not be necessary for the time to be consumed by the Executive Committee in communicating with the roads and getting their advices.

MR. MORRIS: I volunteer that the C. & O. will make road tests for the Association.

MR. RHODES: I would state that some portions of the C. B. & Q. will volunteer to carry out road tests for such committee as may be appointed.

MR. LEWIS: The C. B. & N. will also do their part on this test.

MR. MARDEN: So will the Fitchburg.

MR. SOULE: Also the Norfolk & Western.

MR. BUSH: The P. C. C. & St. L.

MR. MITCHELL: The New York, Lake Erie & Western will assist wherever they can.

MR. HAYWARD: The Pennsylvania Railroad would also be pleased to coöperate in those tests.

MR. BARBER: The Northern Pacific would also be willing to assist.

MR. HOFFECKER: The Central Railroad of New Jersey also.

THE PRESIDENT: This will indicate that we will get pretty good road tests, I think. We will now take up the report of Committee No. 10—Air Brake Tests. Mr. Rhodes is chairman.

MR. CLOUD: I might say that we have no printed copies of this report to distribute.

THE PRESIDENT: The original report of the Air Brake Committee is not in the room. So we will take up No. 11 on Freight Car Truck Frames. Mr. Barber is chairman of that committee.

Mr. Barber read the following report:

REPORT OF THE COMMITTEE ON FREIGHT CAR TRUCK FRAMES.

To the President and Members of the Master Car-Builders' Association:

Your committee, appointed to report on freight car truck frames and other parts connected therewith, would respectfully state we did not consider the Association desired the committee to make recommendation for a standard freight car truck, but simply to get an expression from each member as to what particular design of truck he favored, and dimensions and locations of the most prominent and vital parts commonly used in a rigid or swing bolster truck, and to call attention to facts based only on reports received, showing defects and deserving merits which, in our opinion, would be of value to the Association, or perhaps the "entering wedge" for a future standard truck.

With a desire to draw out this information, the committee issued a circular letter to all members, which, unfortunately, was answered by only about twenty-five per cent of the members of the Association.

It is believed by your committee that if arch bars, tie straps, column bolts, truss rods, springs, etc., could not be made of a standard uniform shape and design, that a standard dimension of material used in these items could be agreed upon for use in trucks constructed for cars of forty (40,000) to sixty (60,000) thousand pounds capacity, thereby reducing to a considerable extent the necessity of our store departments carrying a large and varied stock of these materials to meet the requirements of repairs of our own and foreign cars that are continually passing over all of our lines, in some cases in a number equal to, if not in excess of, our own cars.

Your committee is also agreed that while a large per cent of the present design of trucks, and especially those made prior to 1887, have many parts that are of faulty construction, there are also many trucks with dimensions and weights of parts greatly in excess of requirements, the result of which is to unnecessarily increase the dead weight which adds to the cost of transportation.

We would recommend that it would be wise for this convention to consider the subject with view of adopting standard dimensions of steel and iron arch bars, bolts, truss rods and material in elliptic springs, to be used in truck construction for cars of 40,000 and 60,000 pounds capacity, of such a design as to admit these parts.

It is also believed that a large variety of dimensions for timbers used in bolsters and transoms of modern design of truck could be reduced and brought nearer to a standard.

The possibility of adopting throughout a standard design of truck appears at this time very distant, as progress and improvement in car trucks are rapidly being made. In fact, the old design of swing beam and rigid trucks (used for past twenty-five years, or prior to 1887) composed of shrunken treacherous woods and common gray iron, with an almost endless number of parts, which, when derailed, break into fragments like so much window glass, are rapidly becoming obsolete, and there is every indication that they must soon be entirely eliminated. It is noticeable that much of the new equipment is being provided with wrought-iron and steel trucks, so designed and constructed as not to materially increase the first cost, and to reduce the number of parts and dead weights, cost of maintenance, loss of life, and other damage claims, caused by weak and defective trucks.

Your committee respectfully submits the following in reply to our questions in circular letter, to which we received answers in part from fifty-three members of the Association:

1. State approximate number of sets (two trucks) of freight car trucks under cars in service on your road.

(A.) Answers received to this question from thirty-five members of the Association, representing as many different lines, show total number of sets of trucks in service, 377,614.

2. What proportion is rigid, and what proportion is swing bolster or vibratory motion trucks?

(A.) Thirty-one answers received, showing total number of rigid trucks in service, 156,033; total number of swing bolster trucks, 153,683; a difference of only 2,350 in favor of rigid trucks.

3. Have you adopted as a standard for cars of 40,000 and 60,000 pounds capacity a rigid or swing bolster truck?

(A.) Thirty-seven members replied to this question, thirty of whom have adopted a rigid truck as standard for cars of both 40,000 and 60,000 pounds capacity, and balance have adopted swing bolster trucks.

4. Are you contemplating changing your present standard truck from rigid to swing bolster design, or *vice versa?*

(A.) Forty members replied to question 4. Twenty-one contemplate no change in their present standard of truck; five will change from swing to rigid, and two from rigid to swing. Twelve will change soon as they are sure of something better than present design.

5. If so (referring to question 4) will you adopt rigid or swing bolster design truck?

(A.) To this question thirty-eight members replied, thirty-four as adopting rigid truck and four adopting swing bolster truck.

The committee would call attention to questions 1, 2, 3, 4 and 5, and answers to same, which demonstrate that rigid trucks are fast superseding the old style swing truck, designed with bolster, suspended in vertical hangers to produce lateral motion, the change mainly due to the increase in number of parts of the old design of swing truck, which rapidly wear out.

6. Has your company in service any considerable number of swing bolster or vibratory motion trucks, constructed after modern design?

(A.) Forty members replied to this question as follows: twenty-four not using any modern design of swing motion truck; sixteen either making test or trial of them under portion of their equipment.

7. If yes (referring to No. 6) what, in your opinion, is the increased per cent of cost, if any, as compared to a modern rigid truck, both in construction and repairs?

(A.) Received replies from thirty-nine members as follows: twenty-nine as having no data on the subject; ten ranging from 2 to 30 per cent increase in cost of construction, and from 1 to 30 per cent in repairs according to design of truck, or an average of 10½ per cent in construction and 14 per cent in repairs in favor of rigid trucks.

Committee would add that answers to questions Nos. 6 and 7 call out the fact that a large number of railroads have not had experience, nor are making any test of a modern swing truck, and a number of those who are using and making test of them under cars of 60,000 pounds capacity have not had them in service long enough to furnish report, but hope to be able to do so a year later, which we decide will be valuable. Your attention is also called to the item of difference reported in cost and maintenance of old style swing and rigid truck, in favor of the latter.

8. On a road bed of average condition and at a maximum speed of thirty miles per hour, do you consider it an element of safety to use a swing bolster truck for freight cars?

(A.) To this thirty-six replied; twenty-three deciding that a swing bolster truck for freight cars under conditions as named embodied no guaranty of safety whatever, but did not produce any data in way of proof or test to substantiate this decision. Eleven decided that swing bolster trucks were desirable, especially to run high speed, and two undecided.

9. Does experience convince you that a swing bolster or vibratory motion truck is necessary for passenger car service, to soften lateral blows and concussions and to cause easy riding of cars?

(A.) Thirty-nine replied to this question as follows: thirty-two in favor of swing bolster truck for passenger car service; two did not think it necessary; five think it necessary on account of the long distance between truck centers only.

Your committee would here call attention to the fact that nearly ninety per cent of the members who reported, express themselves as in favor of a certain amount of lateral or vibratory motion for passenger cars. The question naturally arises, if these requirements are needed for passenger cars, why are they not good for freight cars as a greater protection against damage to freight, which is frequently injured by rough riding of cars, and to lessen lateral shocks of rolling stock against track and rail, and we would, therefore, respectfully recommend that this question (No. 9) be carefully considered by all the members.

10. Have you noted any marked difference in the wear or heating of journals and journal bearings as between rigid and swing trucks? If so, in favor of which style?

(A.) This question was answered by thirty-eight members; thirty-two answering that they could not see any difference; three in the affirmative in favor of rigid trucks, and three in favor of swing bolster trucks.

11. In your opinion are swing bolster trucks constructed of modern design more severe on bolster springs than rigid truck?

(A.) Thirty-nine members replied to this question; nine believing that swing bolster truck is more severe on bolster springs than rigid truck; twenty-two that they are not, and eight are undecided.

12. Have you noted any marked difference in the breakage or wearing of wheel flanges or treads as between rigid and swing bolster trucks? If so, in favor of which style of truck?

(A.) To this thirty-one members replied; twenty-seven as not noticing any difference in favor of either style of truck; four noticing a difference in favor of swing bolster truck.

13. If swing bolster trucks are considered a greater element of economic results as to decrease of wear of wheel flanges, brasses and journals, and to decrease of wear and tear of track, and to carry car body more steadily than rigid trucks, would you not prefer to adopt them for freight cars, providing it did not increase the cost of construction and maintenance over that of rigid trucks?

(A.) To this question ninety per cent of those who replied answered yes; seven answered no, or in favor of rigid trucks for cars of 60,000 pounds capacity, and two undecided.

Your committee would particularly call your attention to this popular and almost unanimous expression, in answer to question 13, and from information received we are safe in saying that the mechanical world is now about ready, or has already started to introduce two or three good practical designs of trucks, which we think will favorably meet this expression of the members, also the approval of those railroads who are wide awake to adopt improvements which will produce safety and economy.

14. State from experience if you consider truck check chains desirable as a factor of safety in cases of derailment?

(A.) Forty answers received to this question; fourteen consider truck chains desirable as a factor of safety in derailments; twenty-six consider them of no value whatever.

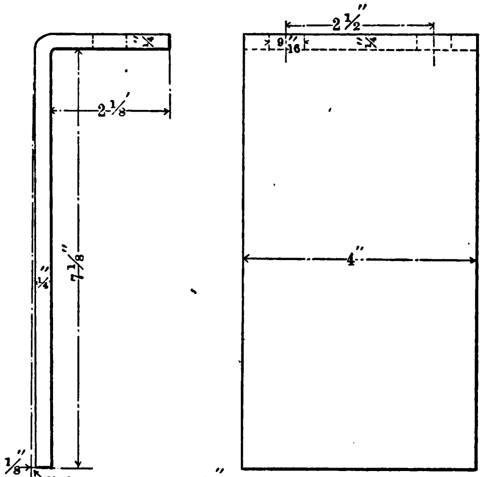
Your committee also received some correspondence relating to truck check chains, the majority indicating that they did more damage than good. It is a well-known fact that in cases of freight trains parting and running together, or in collision, as well as derailments, the car body will be forced into nearly all imaginable shapes and positions, regardless of whether they are fitted with check chains or not, and you have, without doubt, noticed cars with many split sills and twisted truck frames, due mainly to the fact that trucks and car body are tied together with check chains. We estimate that a set of check chains and their fastenings, well made and applied to each corner of truck and properly attached to the car, will cost $4.50 per car, and the best estimate we can get as to cost of their maintenance per annum for repairs and renewals, is about twelve per cent of their cost, which, when added to the original investment, shows an expense, we believe, worthy of further consideration of the members, to recommend whether check chains should be maintained or eliminated altogether.

15. If your experience admits, state preference as between pressed steel, malleable and cast-iron center plates.

(A.) Thirty-nine replies received; thirteen in favor of pressed steel; nine in favor of malleable; eight cast-iron; and nine undecided.

16. Have you had any experience with pressed steel chafing plates on swing bolster and truck transom; if so, do you consider them more economical than gray or malleable iron.

(A.) To this question forty-two members replied; thirty-eight as not having had any experience; one undecided, and two having experience with pressed steel friction plates. The latter state they are very much lighter and of greater durability and cost no more than when made of other metal. Another member reports that he is making his friction plates from pressed steel and from scrap steel which accumulates from broken and worn-out elliptic springs. We call attention of those who use them, to drawing of an ingeniously designed friction plate which is simple to secure and maintain.



Note: To be pressed 1/8" less than a Right Angle

17. In a four-wheel freight truck, 6 feet 3 inches between centers of arch bars, for cars of 60,000 pounds capacity, how far apart do you place centers of side bearings and centers of truck springs.

(A.) Thirty-nine answers received; of this number twenty-three place truck spring centers 6 feet 3 inches apart; sixteen place them from 4 feet to 4 feet 10 inches; sixteen place side bearings 5 feet centers; and twenty-three from 4 feet to 4 feet 10 inches, or an average of 4 feet 6 inches.

Your committee would add that other information gained from members leads it to decide that a truck can be constructed with a greater capacity at less expense by designing a truck with springs resting as near as possible in the center of the frames or such bars and journals, which are considered the foundation of the trucks. One of the committee personally inspected sixty-three different cars belonging to various lines, and particularly noted that those trucks designed with springs resting in the center of frames were in much better condition than trucks built with springs located away from the center line of truck frames and journals.

18. Do you experience any difficulty with truck bolsters springing down at center, requiring center plate to be frequently blocked up, to allow free motion between side bearings?

(A.) Thirty-eight replied to this question; twenty-eight as having difficulty with truck bolster springing down at center; ten having no difficulty, on account of bolster being constructed with a good factor of safety.

19. In a wood bolster trussed with one or two rods, do you not experience difficulty with rods elongating or breaking, both in your own and foreign cars, causing truck bolster to sag down at the center when cars are loaded to their full capacity, and especially when slightly overloaded?

(A.) Thirty-nine answers received; thirty-three of these experienced such difficulty; six do not.

20. If you use a double-trussed oak bolster, do the truss rods rest centrally on a single block in the saddle or on a king post, and do the truss rods pass through to the end of the bolster or rest on a shoulder inside of truck frames?

(A.) To this question thirty-six answers were received; twenty-four use truss rod with outer ends resting on shoulder inside of truck frames; nine with truss rod resting on end of bolster outside of truck frames; three do not use truss rods, and the majority rest truss rods on a single block in the saddle.

21. Referring to No. 20, give distance from center to center of bolster, king posts, and depth or length of post or block.

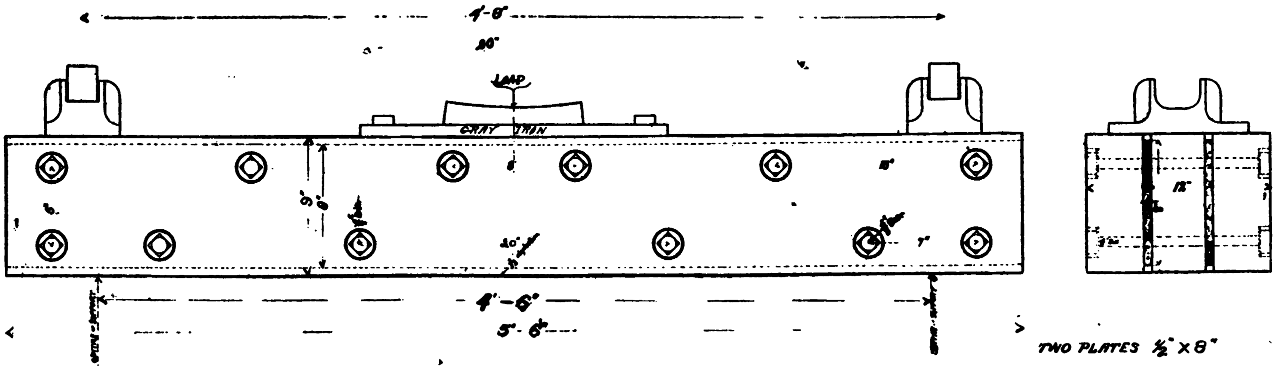
(A.) Thirty-nine members replied to this question; eleven of whom rest truss rods centrally on saddle; twenty-three, depth of saddle varied, ranging from 1 to 4½ inches; six have depth of saddle 3 to 3½ inches; nine, 4 or 4½ inches, and eight, 1½ inches; sixteen, distance of centers varied from 16 to 20 inches; five, showing distance at 14⅜ inches; three, at 16 to 16¾ inches; two, at 20 inches; one, 6 inches; another, 8⅝ inches, etc.

22. Do you use a compound bolster composed of two or more iron or steel plates, applied edgewise and bolted together between timbers? If so, do they become defective on account of the timbers shrinking, causing the transverse or packing bolts to become loose, thus destroying a large per cent of solidity of the bolster, until bolts are again tightened up?

(A.) Thirty-seven answers received to this question, showing that fourteen do not use compound bolsters; eleven, as having no trouble with compound bolsters; seven having trouble with them, and five just commenced using compound bolster and are not able yet to report.

The object of your committee in submitting questions Nos. 18, 19, 20, 21 and 22 was to gather information, if possible, in regard to the carrying capacity of the different designs of bolsters, as it is a well-known fact that fully fifty per cent of those applied under cars prior to 1887 have no factor of safety for carrying a load equal to or greater than the intended capacity of car, without deflection at the center sufficient to transfer a large per cent of the load from center plates to side bearings, producing expensive and dangerous results, familiar to many of us. You will note that the majority of members express themselves as having difficulty with weak bolsters, and a number also stated the defect had, in their opinion, caused derailments on account of trucks not curving freely; your committee therefore decided to make a few tests of bolsters, the results of which are shown in diagrams herewith.

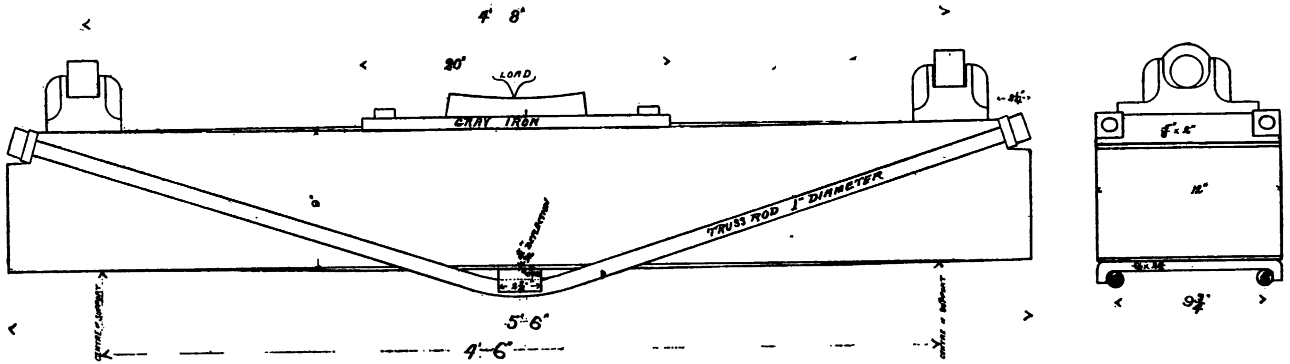
(See exhibits 1 to 6, showing bolsters tested and the results.)



LOAD ON CENTRE	DEFLECTION	PERMANENT SET
20,500 lbs.	$\frac{3}{32}$"	0
22,000 "	$\frac{1}{8}$"	0
25,000 "	$\frac{5}{32}$"	0

CAP'Y OF CAR 40000 lb.

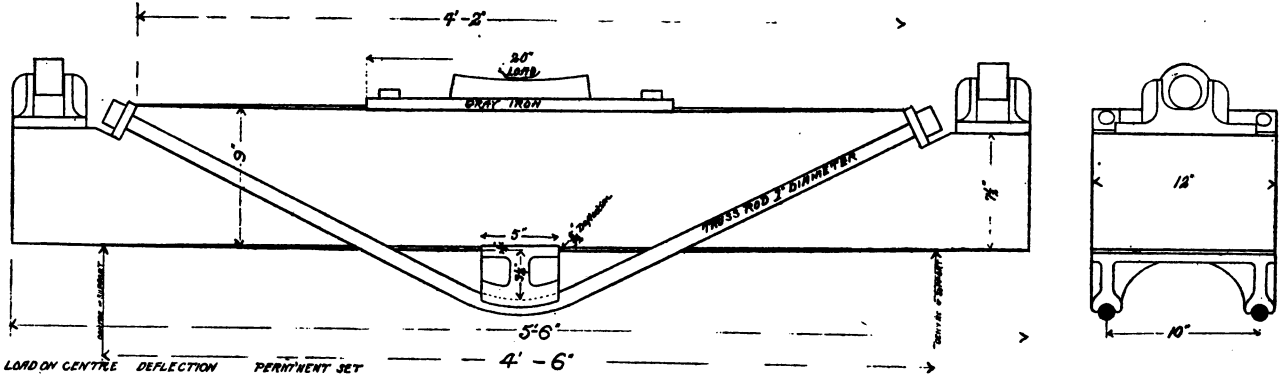
COMBINATION BOLSTER (TWO ½" IRON PLATES)
—FOR—
IRON BODY BOLSTER



LOAD ON CENTRE	DEFLECTION	PERMANENT SET
20500 lbs	5/32"	0"
22000 "	3/16"	1/16"
25000 "	3/8"	5/32"

CAP'Y. OF CAR 40000 lbs.

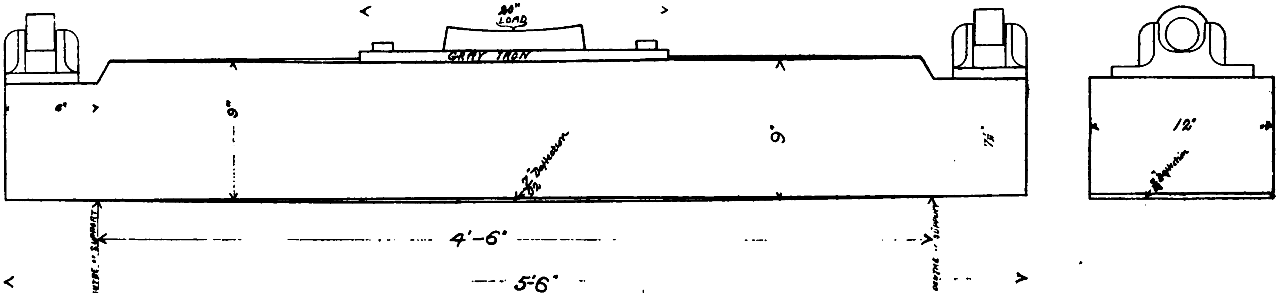
WOOD BOLSTER TRUSSED OUTSIDE OF SIDE-BEARINGS FOR IRON BODY-BOLSTER



LOAD ON CENTRE	DEFLECTION	PERM'NENT SET
20,500 lbs.	$\frac{4}{32}$"	0"
22,500 "	$\frac{5}{32}$"	$\frac{5}{32}$"
25,000 "	$\frac{7}{16}$"	$\frac{7}{16}$"

CAPY. OF CAR 40,000 lbs.

WOOD BOLSTER TRUSSED INSIDE OF SIDE-BEARINGS
FOR
WOODEN BODY-BOLSTER



LOAD ON CENTRE	DEFLECTION	PERM'NENT SET
20 560 lbs.	$\frac{7}{32}$"	$\frac{1}{32}$"
22 000 "	$\frac{8}{32}$"	$\frac{1}{16}$
25000 "	$\frac{13}{32}$"	$\frac{1}{8}$

CAP'Y OF CAR 40000 lbs.

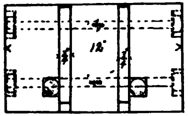
ALL WOOD BOLSTER
FOR
WOODEN BODY BOLSTER

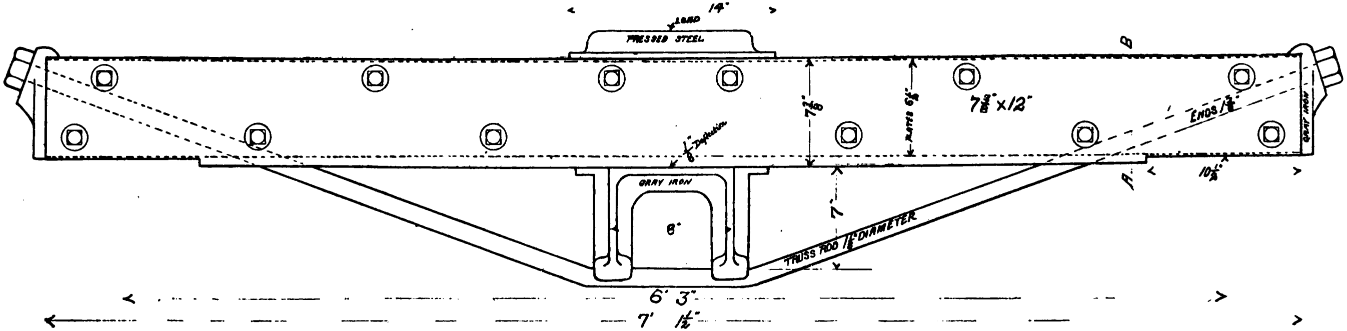
LOAD ON CENTRE	DEFLECTION	PERMANENT SET
15.000 lbs	$\frac{1}{32}$"	0"
20,000 "	$\frac{7}{128}$"	0"
25,000 "	$\frac{1}{8}$"	0"
35,000 "	$\frac{9}{64}$"	0"

COMBINATION TRUSSED BOLSTER

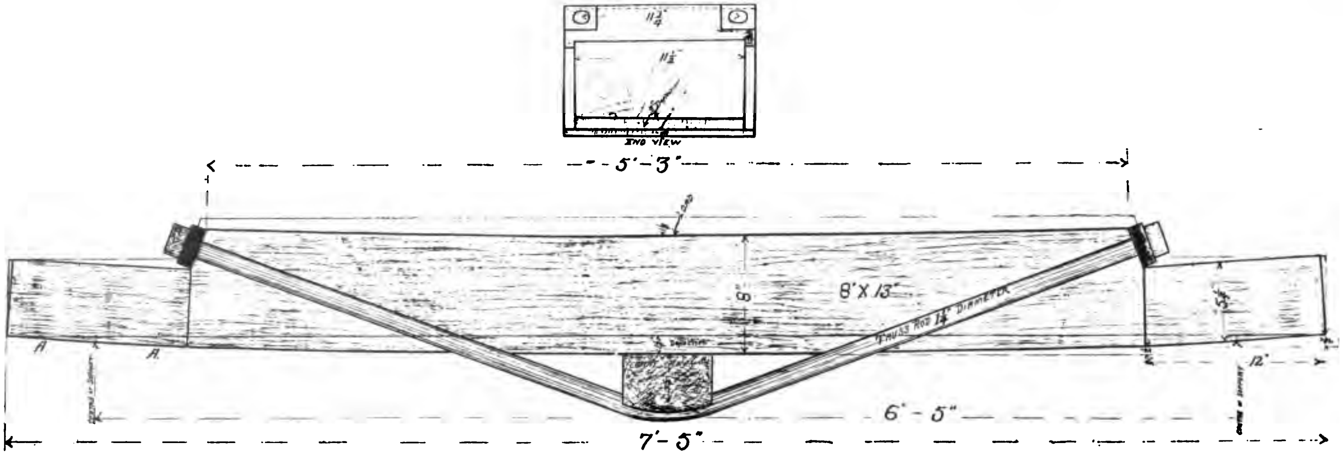
Two $\frac{3}{4}$" Plates $6\frac{1}{2}$" Wide, Two Truss Rods $1\frac{1}{8}$" Diameter

SECTION THROUGH A.B.





CAPY OF CAR 60,000 lbs.



AR. SPRINGS—INNER COIL 1/2" PERMANENT SET

LOAD ON CENTRE	DEFLECTION	PERMANENT SET
25 000 lbs.	1 3/8"	1 1/4"

RIGID TRUCK BOLSTER
CAR OF 50000 lbs. CAPY.
IN SERVICE TWO YEARS

23. If you use iron or steel channel-bar transoms, what is the extreme measurement in length, depth and thickness of web and flanges for cars of 40,000 and 60,000 pounds capacity?

(A.) Thirty-four members replied to this question; twenty-six as not using channel-bar transoms; two using channel-bar transoms 6 feet 6 inches in length; two using transoms 6 feet 8½ inches; four, 7 feet 5 inches; nearly all using the M. C.-B. standard channel.

24. If you use channel bars, either flatwise or edgewise, state whether they are bolted or riveted to the intervening column or truck-end casting?

(A.) Twenty-three answers received; eight not using them; nine riveted to truck column, and five use channel bars flatwise bolted to truck columns.

25. Referring to No. 24, give size and number of bolts or rivets applied to each end of channel bar, and state your preference?

(A.) To this question forty answers were received, showing a preference for ¾-inch rivets for securing channel bars that rest edgewise against columns, and ¾-inch bolts to secure those used flatwise for spring planks on rigid trucks.

26. Please give number of parts, including wheels and axles, wood and lag screws, washers, nuts, bolts, rivets, and all other parts in one of your trucks of 60,000 pounds capacity, and also trucks of 40,000 pounds capacity?

(A.) A large number of the members evaded question No. 26. Of the thirty answers received, the largest number of parts in a swing-beam truck is shown to be 466; the lowest number of parts 145. The largest number of parts in a rigid truck is 323, or 133 less parts than in a swing truck. The lowest number of parts reported in swing truck is 145, lowest number in rigid truck is 85, a difference of 60 parts less in favor of rigid truck.

Your committee went to the trouble of counting the parts in trucks under a large number of foreign cars that we failed to get report of, and are pleased to say that many of the trucks of recent design show a decrease in parts of nearly twenty per cent, while a few others have evidently not given the subject of reducing parts much study, and we strongly recommend that the question of reducing number of parts in car trucks be carefully considered, as there are many cases where the life and capacity can be increased, and the first cost and cost of maintenance reduced a very large per cent by so doing.

27. If you are using a considerable number of trucks with transoms and bolsters composed of wood, principally, are they not expensive to maintain on account of wood parts shrinking and warping out of place?

(A.) To this thirty-five members replied; twenty-five claiming they are expensive to maintain, and eleven that they are not.

The committee made personal inspection of sixty-one different styles and makes of freight trucks, largely composed of wood transoms and bolsters, and every truck was more or less defective on account of the parts shrinking, causing loose bolts, and many other parts split, checked, cracked, splintered, worn away, warped, etc., and we therefore recommend that timber not thoroughly seasoned is unfit for car truck construction to produce economic results, and as builders cannot use seasoned timber, we would recommend the introduction of steel or wrought iron in place of green, unseasoned timber.

28. In your experience, gained from observation and test, is not an iron or steel truck cheaper to maintain than a wooden truck?

(A.) Thirty-nine replies received; twenty-nine claim a steel or iron truck is cheaper to maintain than wooden ones; ten say they are not.

Some very interesting information was received by the committee on this subject, which leads us to recommend that a good design of wrought-iron or steel truck can be maintained for about eighteen per cent less than the best design of wood truck, and especially many of the swing beam patterns.

29. What, in your opinion, is the proper wheel base for a four-wheel freight truck, 4 feet 8½ inches gauge ?

(A.) Information received on this subject gives a majority in favor of wheel base being 5 feet; a number would prefer the wheel base 5 feet 2 inches to 5 feet 6 inches for inside connected brakes for cars of 60,000 pounds capacity.

30. Assuming 5 feet as the maximum wheel base, of what size bar iron would you make the top and bottom arch bars and tie strap, in a 60,000-pounds capacity truck, with a chamber of 15 to 18 inches between arch bars ?

(A.) To this question thirty-nine members replied ; twenty-three answered that their standard top arch bars were 1¼ by 4 inches, bottom arch bar 1⅛ by 4 inches, and tie strap ¾ by 4 inches. Eight members report that they prefer top arch bar 1⅛ by 4 inches, and bottom arch bar 1 by 4 inches, and tie strap ¾ by 4 inches. A few were using 1⅜ by 4 inches for top arch bars, and 1 by 4 inches for bottom, and ¾ by 4 inch tie straps.

All of the above dimensions were reported as being entirely satisfactory, and if such is the case, it is evident to your committee that some of the arch bars in use are excessive in dimensions and weight.

31. What size would you recommend for the diameter of truck column bolts for cars of 60,000 pounds capacity ?

(A.) Thirty-eight members answered this question; twenty-nine would recommend 1¼-inch bolts; five 1⅜-inch, and four would recommend 1⅛-inch bolts.

The replies show a preference in favor of 1¼-inch column bolts (four to each truck), and your committee is of the opinion that if 1¼-inch column bolts are made with a good fillet under the heads, they will be entirely satisfactory for service for trucks of 60,000 pounds capacity.

32. To secure column and oil-box bolts, do you prefer double nuts or one nut secured by round spring cotter, or tapered flat split key for each of these bolts ? or do you prefer nut lock ?

For lack of information from members, your committee has no comments to make other than that the majority expressed themselves as in favor of securing bolts with one nut and spring cotter. A large number were either using or testing various designs of patent nut locks.

33. In your experience in securing single nuts with spring cotters, do you not have difficulty in getting spring cotter to lock against the nut closely, on account of the varied distance caused by shrinkage of castings ?

(A.) Thirty-nine replies received to this question; twenty-nine as having difficulty mentioned ; six having no difficulty, and four have had no experience.

It will be seen from this expression that the majority of the members are having difficulty in getting spring cotter to lock or bear against the nut closely. Your committee inspected a large variety of equipment from one to two years old, and found many of the bolts locked as mentioned (in question 33), with loose nuts, on account of the shrinkage of timber and gray iron castings, which varied the distance between cotter and bolt heads, and your committee would, therefore, recommend that the bolts be locked with double nuts or a steel nut lock of good and safe design.

34. Are you in favor of inside brakes suspended to the truck frame, or outside brakes suspended to car body ?

(A.) Forty members replied to this as follows: twenty-six in favor of suspending brakes to the truck ; fourteen in favor of suspending brakes to car body.

Your committee would call attention to the fact that a large portion of the rolling stock designed in the past three or four years, is equipped with inside brakes suspended to the truck transoms. Quite a number of the members stated that brakes suspended to the truck frames are cheaper in first cost and cost of maintenance, and will aid in preventing brake shoes from wearing against wheel flanges, which is usually the case when they are hung to the car body, due to the swaying of car body, more particularly when on curves.

35. Do you not consider metal brakebeams more economical than double trussed wood beams on trucks under cars equipped with air brakes?

(A.) Thirty-eight members replied to this question; twenty-seven consider metal brakebeams more economical than double trussed wood beams; eleven consider a double trussed wood beam more economical.

Your committee received several statements as to cost and maintenance of metal and double truss wood brakebeams for air-brake service, which leads us to decide that metal brakebeams are as cheap in first cost, and are from three to seven per cent cheaper to maintain than double trussed wood beams.

36. Have you had any experience or made any personal observations enabling you to form a sound opinion as to the merits of the pressed steel truck frame illustrated on pages 38 and 39 of Master Car-Builders' Association report of 1891, and, if so, is your opinion favorable or unfavorable?

(A.) To this forty-one replied; twenty-five as not having had experience; eleven having had experience, favorable; two unfavorable; two having had no experience, but have good opinion of truck.

37. Provided a pressed steel truck frame can be made as claimed, cheaper, lighter and stronger than the strongest "Diamond" frame, do you consider the form of side objectionable as not admitting of a low down car body when required, like a properly constructed "Diamond" frame?

(A.) Forty answers received to this question; twenty-two objectionable; fourteen not objectionable; three undecided; and one having had no experience.

38. In your opinion, would truck springs, placed upon the top of the oil boxes, do as good service as if placed upon a central spring plank or bolster?

(A.) Thirty-nine replied; twenty-one that it would not do as good service; fifteen that it would give as good service.

39. In the pressed steel truck referred to, do you consider the space provided for spiral truck springs large enough to admit springs of sufficient capacity for cars of 60,000 pounds capacity?

(A.) Forty-one replies received; twenty-six do not consider space large enough; thirteen consider space large enough; two are undecided.

40. In your opinion, would it be objectionable in a pressed steel truck frame to have the transoms and side arches riveted together, as shown in the illustrations referred to?

(A.) Forty replies received; twenty-five answered no, that it would not be objectionable to have transoms and side arches riveted together; fourteen decide that it would be objectionable, and one is undecided.

41. In your opinion, would the pedestal jaw of the pressed steel truck, illustrated, make it more difficult to remove and replace than with the arch bar side frame?

(A.) Forty replies received to this question; nine answered no; twenty-nine that it would be more difficult, and two stated that if wheels were taken out in modern drop pit, it would reduce the cost over the old style truck.

42. State any other consideration that may occur to you, adverse to or in favor of the pressed steel truck frame.

(A.) Forty-one members answered this question as follows: five answered considerations in favor of 1,500 pounds deduction in weight per car, cost of repairs reduced to minimum; three find it difficult to repair when wrecked and bent; one finds it difficult to inspect on account of number of parts; one finds it much easier to inspect than the old-fashioned "Diamond" truck; one finds it objectionable on account of the pedestal broadly covering face of the wheel, preventing inspection of same; one objects to the design of the truck; one believes the pressed steel truck is O. K.; four are not prepared to make report on account of short time truck has been in service; twenty-four are not prepared to say anything for or against the truck.

43. If pressed steel rigid truck frames prove satisfactory for certain classes of freight cars, is it not desirable that a similar truck be designed for the use of elliptic springs and vibratory motion, to meet the requirements of palace stock cars, express, refrigerator and other special freight cars?

(A.) Thirty-eight members answered this question; thirty-six believing it desirable; one not desirable, and one undecided.

In answers to questions Nos. 36, 37, 38, 39, 40, 41, 42 and 43, the committee has no new information to report relating to the Fox Solid Pressed Steel Truck. Quite a large number of the lines using the truck were not able to express a decided opinion, on account of the truck not being in service long enough. The majority of the members believe that the introduction of pressed steel for freight car trucks is a move in the right direction, and will produce economic results worthy the consideration of the Association. In answer to question No. 43, we would call attention to the almost unanimous expression that elliptic springs and vibratory motion are desirable in special cases.

44. In a swing bolster truck, what distance do you allow between the end of bolster and intervening truck transom castings or frames, this distance to be considered the limit of the swing motion of bolster?

(A.) Twenty-six replied to this question; thirteen allow a distance of 2 inches at each end; six, 2½ inches; two, 1½ inches; two, 1 inch; one, 4 inches; one, 3 inches, and one, 1¼ inches.

From the best information received from members, and decisions arrived at from practical test of both freight and passenger cars of the swing bolster pattern, we find that the lateral motion of bolster rarely exceeds one inch each way from the center, and your committee would recommend this distance, as meeting all requirements.

45. In a swing motion truck, do you apply truck hanger by setting the center in or out, or in a vertical plane? If in or out, state distance from plumb line.

(A.) Your committee received thirty-one answers to this question; fifteen set truck hangers 1½ inches outward from plumb line. The balance of the information received was not made clear enough for further report.

46. State dimensions of plain oak (not trussed) truck bolsters, if you use them, in your rigid or swing truck for cars of 40,000 pounds capacity.

(A.) Thirty-seven members replied. Dimensions of plain oak bolsters as used by the different members heard from are as follows: Two, 9 by 12 by 64; one, 8 by 12 by 90; one, 9 by 10½ by 68; one, 10 by 10½ by 66; one, 9 by 12 by 87; one, 9½ by 10½ by 69; one, 8½ by 11¼ by 66; one, 10 by 12 by 60; one, 8½ by 12 by 90; one, 10 by 12; one, 9 by 12 by 65. Twenty-two members used bolsters trussed.

Your committee tested the largest and the average size, the result of which satisfies your committee that the deflection at center of bolster, under load of 40,000 pounds, in addition to load of car body, was of an extent to cause us to decide that none of them had any factor of safety whatever and allow free curving of the truck.

47. Inasmuch as truck bolsters are located under the car and required to receive the weight of car and load direct, and cannot be repaired or adjusted without detention to the car to remove the truck, is it not therefore important that truck bolsters be constructed with a view of securing a greater factor of wear and safety than many of those at present in service?

(A.) Thirty-nine answers received, all in favor of truck bolsters being constructed with view of securing a greater factor of wear and safety than many of those at present in service.

Your committee has nothing further to add in answer to question 47, except to say that there was a general expression that it is very important truck bolsters be constructed with view of securing a greater factor of safety, and many members freely stated that they found more defects in bolsters of freight trucks than in any other item about the truck.

48. From experience, can you recommend any particular style or make of dust guards, and material composed of?

Your committee could not procure information that would lead them to decide in favor of any particular style of dust guard. Many patent devices are in use, but have not been in service long enough to decide as to their usefulness and durability.

49. From experience, do you find the standard M. C.-B. journal box, lid, brass and key satisfactory?

(A.) Thirty-nine answers received; eighteen find the M. C.-B. journal box, lid, brass and key satisfactory; twenty-one do not.

As the subject of journal-box lids is being considered by a special committee, your Committee on Trucks consider further report unnecessary.

50. Judging from present and past experience, would you recommend wrought-iron or steel freight trucks to be more economical than a truck constructed of gray (cast-iron) iron and transom and bolster of wood.

(A.) Forty-one members replied to this question; thirteen recommending freight trucks all of steel; eight are in favor of pressed steel; nine are satisfied with present style of truck; three recommend wrought-iron and steel; two recommend wrought-iron trucks; one is in favor of cast-steel of the "basic" process; and four believe that some radical improvement is necessary.

Your committee also received considerable information as to first cost and cost of maintenance of the common wood and gray iron truck of the "Diamond" pattern, as compared with modern freight truck composed largely of wrought-iron and steel. Reports show that the first cost of the latter trucks are considered from five to fifteen per cent greater, but that this is fully offset by the difference in cost of maintenance in one or two years' service.

In conclusion, your committee would call attention of members of the Association to the importance of a much-needed improvement in car trucks, which are not, in our opinion, in many cases, keeping pace with the dimensions and capacity of car bodies, and we therefore recommend for your consideration for improvement a few of the most vital points in trucks intended for cars of 40,000 and 60,000 pounds capacity:

1. Uniformity in dimensions (except length) of materials used in arch and tie bars. Transom and bolster truss rods, oil box and column bolts; side bearing and center plate bolts; spring steel used in elliptic springs; iron and steel truck transoms.

2. Truck bolsters made and designed with a sufficient factor of safety to carry the marked capacity of the car without deflection enough to disturb free action of the side bearings.

3. That many of the trucks need to be redesigned with a view of diminishing the number of parts fully twenty-five per cent, thereby reducing first cost and maintenance.

Respectfully submitted,

J. C. Barber,
M. C.-B., N. P. R. R.
W. S. Morris,
Supt. M. P., C. & O. R'y.
S. A. Crone,
M. C.-B., N. Y. C. & H. R. R. R.,
Committee.

Mr. Marshall: I move that the report be received and printed in the minutes.

Mr. Mitchell: I second that.

The motion was carried.

The President: Are there any parts of the report that the Association wishes to discuss.

Mr. Sanderson: I would like first to compliment the committee on the thoroughness they have displayed in cross-questioning members to bring out the information that they were after, but there is a point about that which I think it would be well to bring up. The questions are so in detail, and most of the members who were asked were probably so busy with their general everyday work, that these little details, which when summed up together comprise the information that was wanted, were not fully covered by the replies. The members had to answer the report in a very short time, and to give competent answers to many of these important points they would have had to go to work and watch these things or have their subordinates watch them. I think that is the reason why the questions were not answered by many of the members. If those questions had been sent out earlier, probably they would have been more fully answered. There are two or three points in connection with the report that I would like to call attention to. The first is in regard to pressed steel center plates, page 6, question 15. The experience we have had with pressed steel center plates has not been altogether favorable. To illustrate it, I will simply say that the members would know what the result would be of pounding on a flat piece of sheet iron with a hammer in the center. The edges would all curl up. The center plates we have used have shown that trouble. The downward pounding on the center has caused the edges to curl up until they pulled out from the wood entirely, and they got to jiggling on the bolsters and sawed off the heads of the bolts. I believe that a solid center plate will be better. I mean a center plate of solid metal with more thickness to it, so that it would not saw the bolt. Referring to question 22 on page 7 — fish-plate bolsters — there is an idea of weakness there about the fish-plate bolster that was not brought out by the question. I think the members will appreciate it. Take the width of the bolster at 12 or 14 inches and cut that open by three strips. The three narrow strips of wood have very little strength; the two fish plates placed between them have very little lateral strength. If a car with such a bolster runs against an end-stop the center pin would bend that laterally. If that was all of one piece it would have strength enough not to give way. We have had a good deal of trouble of that kind. In addition to that, as mentioned by the committee, when the wood shrinks a little the narrow iron plates standing on end are unsupported and they buckle and give way under load. As regards the shrinkage of wood — oak, such as is used for these bolsters — I have measured a good deal of it, and find that with the ordinary oak we can get there is a shrinkage anywhere from ⅜ to ½ an inch on 12 inches inside of eighteen months of service. You can see that in any construction which is a combination of iron and wood it is going to shrink like that, where the iron depends on the backing of the wood, we cannot expect good results. Referring to question 25 on page 14, I am not convinced that it is not practicable or quite feasible to get at the results that we want with the use of a nut and a split key, provided the split key is properly formed. It is not a difficult matter in modern bolt machines to keep the distance between the face of the head and the outer end of the slot uniform; that is with machine work. It might be different with hand work. And to make up for little differences in the casting and roughness of the arch bar, if the key used is given a slight taper on its length, it will take up all that variation and answer every purpose. Referring to question 30 on page 15, the committee brought out some information about the sizes of arch bars. Now, I believe that a good many arch bars are made unnecessarily heavy on account of a misunderstanding of the causes of breakage. For convenience in shop work the bends of the arch bars are made unnecessarily long — kept away from the castings around which they are supposed to hug, as it were. Consequently there is a weak place right where this bend is on that lower arch bar especially, and we have had a great deal of trouble both with our own and foreign trucks on account of the arch bars breaking. We at first thought they were too weak; but I feel certain the cause of it is not in the weakness of the bars, but in the way they were bent. If they had been bent close up to the casting and the angle well supported so that the thrust came in a direct line down the arch bar to the nut, that breaking would never take place. In the lower arch bar instead of a thrust it is a pull, but the pull has a tendency to draw the arch bar out at the bend, and the cracking is always found with us on the upper side of the bar, and I can see no other cause in the world that would cause the lower arch bar to break at that point except by bending.

MR. BISSELL: The long bend is at the upper end where it rests on the pedestals.

MR. SANDERSON: Where it rests under the column on the lower arch bar.

MR. BISSELL: But the long bend is where it rests in the pedestal at the end.

MR. SANDERSON: Supposing *this* (illustrating) to be the column and *this* the lower arch bar, and the box outside, this bend is where the column bolt comes down through the inverted arch bar. I think a good deal of unnecessary iron has been put on the arch bar for similar causes to that. Another thing — I notice in column castings the back of it next to this bend is round instead of being square or cast so that it would fit the end of the arch bar. It is impossible to make a job of a joint there at all unless the casting is made to suit. There is another point that has caused some trouble about truck frames which I think is generally overlooked. In the bottom tie bar it is generally thin — some 3/8, some 1/2, some 3/4 inch. Most of the old trucks especially are thin. The holes are punched mostly. The bolt is not made unnecessarily long. The threaded portion of the bolt is in the hole. The thread is cut back along the bolt far enough to be sure that the nut will not bottom in the thread before it pulls up tight. Consequently the whole bearing of the bolt in that bottom tie bar is on the thread, and we find in taking those bolts out and renewing them that the thread is sawed away on the outer edges of the holes, leaving the boxes to spread out. Now, if that bottom tie bar is in use, if it is going to hold those boxes perpendicularly in the frame, the bottom tie bar must have a bearing on those bolts that will be of some service. The holes should not be punched but should be a neat fit on the round section of the bolt, and if necessary the bolt should be made longer and the washer applied underneath so that the threaded portion of the bolt can be kept entirely below the bottom tie bar.

MR. LEWIS: If I understood the gentleman correctly in his criticism of question No. 30 he stated that a number of the bottom arch bars broke on the upper side near the column bolt. I cannot understand how that could occur. The weight, as you know, is applied to the top of the bottom arch bar, which would throw a compressive strain on the upper side of the arch bar, and if a crack would develop it would seem to me that the crack would develop on the bottom side of the arch bar, if from the cause that the gentleman states.

MR. SANDERSON: I think probably the gentleman is figuring on the box end, not on the column end. The compression is on the upper arch bar. The load coming on the journal box presses the outer end of the upper arch bar upward and the upper arch bar is in compression. The lower arch bar has to prevent the outer ends of the upper bar from going up, and consequently it is in tension from the column bolt to the box—not in compression.

MR. LEWIS: If there is any deflection to the lower arch bar it must of necessity throw a compression on the upper side of the arch bar, not on the lower side. If the lower arch bar deflects downward the compressive strain must be on the top of that arch bar.

MR. SANDERSON: That is up.

MR. LEWIS: I think not.

MR. RHODES: I would like to call attention to one point in this report. I believe that we sometimes find things on our lines in an unsatisfactory condition, and then we at once branch out to get something new, and I think that we ought to be very careful in doing that to remember that we do not know anything about the new device. We do know all the bad points about the old device, but we do not know the bad points about the new device. Sometimes we are so dissatisfied that we are ready to go into new territory and take up something new, but we do not always get something better than the old device. I think that under a freight car is perhaps as bad a place as you can select for making any test. I do not know of any more complete way of burying a test than to apply it to a freight car. It has been our practice for some years past to make our tests under the tanks of our engines, and in a good many cases we have had curious replies from those persons interested in the devices that we were testing. We were told that they were not intended for such tests; that they were not strong enough for that service; that they were intended for freight cars. Now, I do not attach very much importance to that kind of a reply coming from a manufacturer, because I argue this way: If I had put this device under a freight car it would have been buried; I would have lost sight of it. The returns I get from under a tank in three or four months it would take me three or four years, perhaps, to get under a freight car. After they do come in, you may find that they are entirely unsatisfactory. In the meantime you may make a report up to two years' service, and up to that time it is good. So it is with the tanks, if you make the report on only two or three months' service. But base your report on a longer service and you get entirely different results. Take brake beams. We have got some very interesting information from tests of freight car brake beams from under tanks, and I have had many curious replies, to the effect that they were not intended for tanks but for freight cars. Now, you put a brake beam under a freight car and you might as well put it down in your cellar — you would get as much result from it. But you put it under a tank and you are constantly getting service. But the brake beam companies should remember that it is not as hard a test as it would get under freight cars, because the tanks are not fitted with quick action brakes, while our freight cars now are fitted with such brakes. Now, with trucks, I believe that when you are making these investigations, if in place of putting the truck under a freight car you put it under some tank and then draw your conclusions from those results, it will be much more satisfactory. If you put a truck under a tank which will run with very little cost for a year or a year and a half, you can then figure on what the equivalent of that would be in freight service and draw your conclusions from it. I think that the committee ought to be very much complimented for their very laborious work. When the circular came to the C. B. & Q. road we felt awfully tired, and I felt like saying, I won't answer. But I thought that it would not be fair to say that, since the committee had taken the trouble to work up all this detail, and myself and our mechanical engineer spent a long time with one of our master mechanics in getting up replies. But, as Mr. Sanderson stated, we could not go into all the details, and it is possible that our replies were not as near to the actual condition of things as we would have liked. I think, as a rule, one does not like long reports that are formed on questions. But this committee has certainly brought in a new idea in the way of asking questions. They have asked the questions and then taken the pains to brief them up for the Association, and it seems to me it is quite an innovation in this style of report and a very commendable one. I would, however, have liked to go a little further than they have done in the way of averaging it. Some of our committees average by cars, which I think is altogether a wrong way. This committee has given the replies. Now, if they had gone a little further and had put in the numbers who did not reply, it would get their deductions on a still fairer basis as representing the Association. For instance take page 4, the note to that question is: "This question is answered by 38 members; 32 answered that they could not see any difference; 3 in the affirmative in favor of rigid trucks and 3 in favor of spring bolster trucks." Now, you see there is a large proportion of the answers that you cannot see any difference in. But suppose they added to that something like this: 300 made no answers; 32 replied that they could not see any difference; 3 in the affirmative and 3 in favor of spring bolsters. Now, as far as any deduction from that is concerned we would just as soon have the opinion of the committee itself. This does not represent the general practice of the members by any means. I commend the committee very highly for their report, and I think it will pay us all to spend more time on it when we get home.

MR. BARBER: I wish to commend the report that we received from the C. B. & Q. road, which is one of the most complete that came to us, and aided the committee greatly in making up its report. We should probably have condensed this report more if we had received a larger number of replies, but as we received reports from only about twenty-five per cent of the members, some parts of the questions were necessarily failures with respect to the information which we intended to produce.

THE PRESIDENT: If there are no further remarks on this report we will have the report of the Air Brake Committee. Mr. Rhodes will please read the report.

Mr. Rhodes read the following report:

REPORT OF THE COMMITTEE ON AIR-BRAKE TESTS,

TO FURTHER INVESTIGATE AND REPORT IN DETAIL WHAT TESTS ARE DESIRABLE TO INSURE BEST AVAILABLE SERVICE.

To the President and Members of the Master Car-Builders' Association:

In your committee's report of last year attention was called to the fact that it was lacking in an essential feature necessary for successfully carrying on the investigations assigned it, namely, a pipe rack, gauges, recording apparatus, competent assistants, etc. It was also stated that the Pennsylvania Railroad had offered to establish for the Association at its Altoona shops a complete set of brake-testing

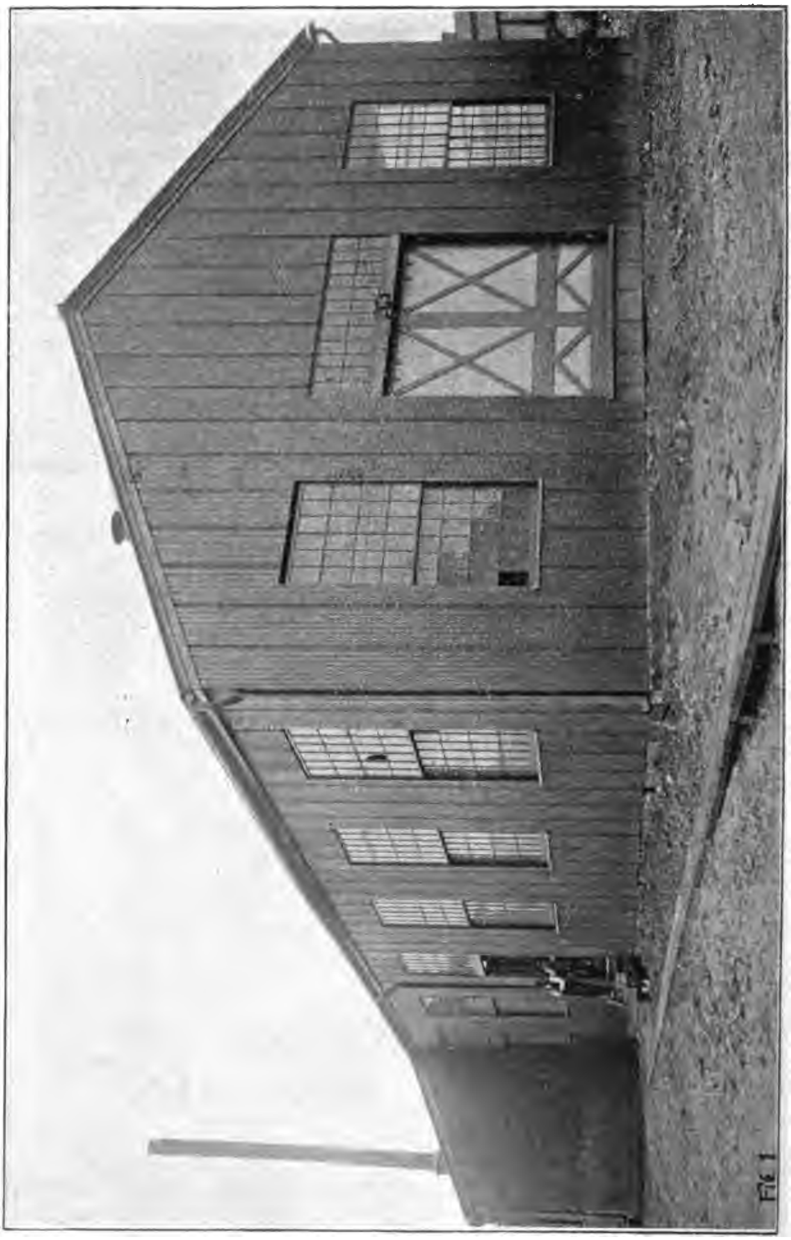


FIG 1

apparatus for the purpose of investigating and reporting upon the different triple valves now on the market or which may develop in the future.

It gives your committee great pleasure to announce that this promise is now an accomplished fact. On May 1, 1893, the Pennsylvania Railroad turned over to your committee a building completely fitted with every detail desired, and which may be briefly described as follows:

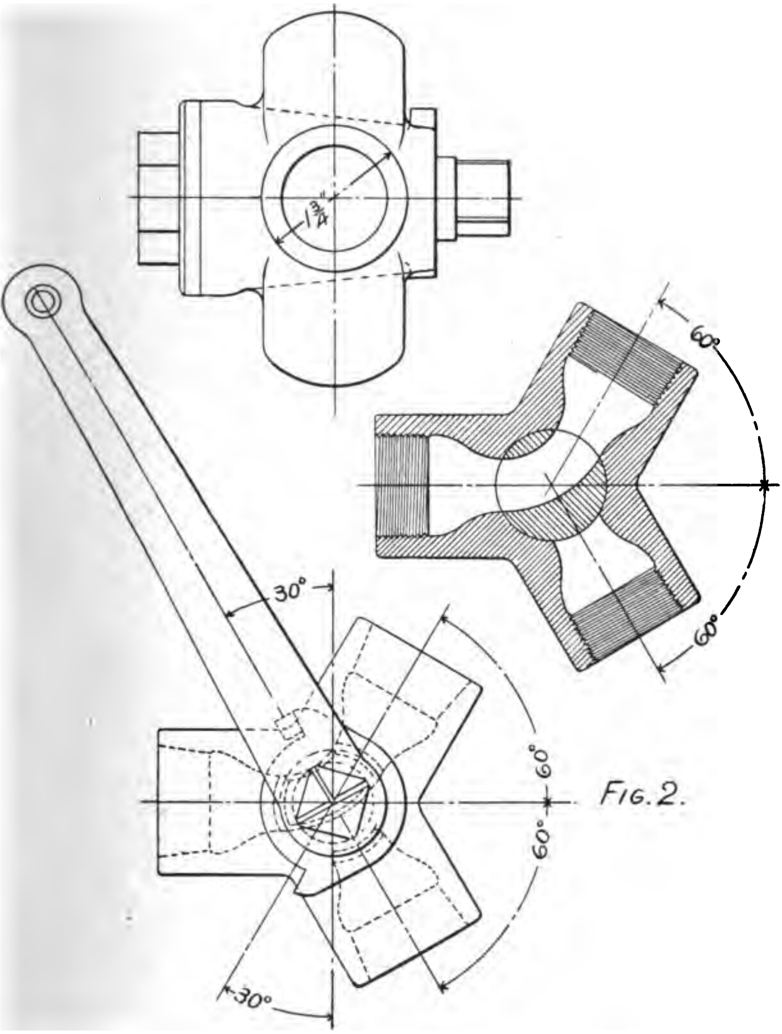


FIG. 2.

The building is 40 by 80 feet, put up in a very substantial manner with timber framing, the outside covered with corrugated sheet iron, of which material the roof

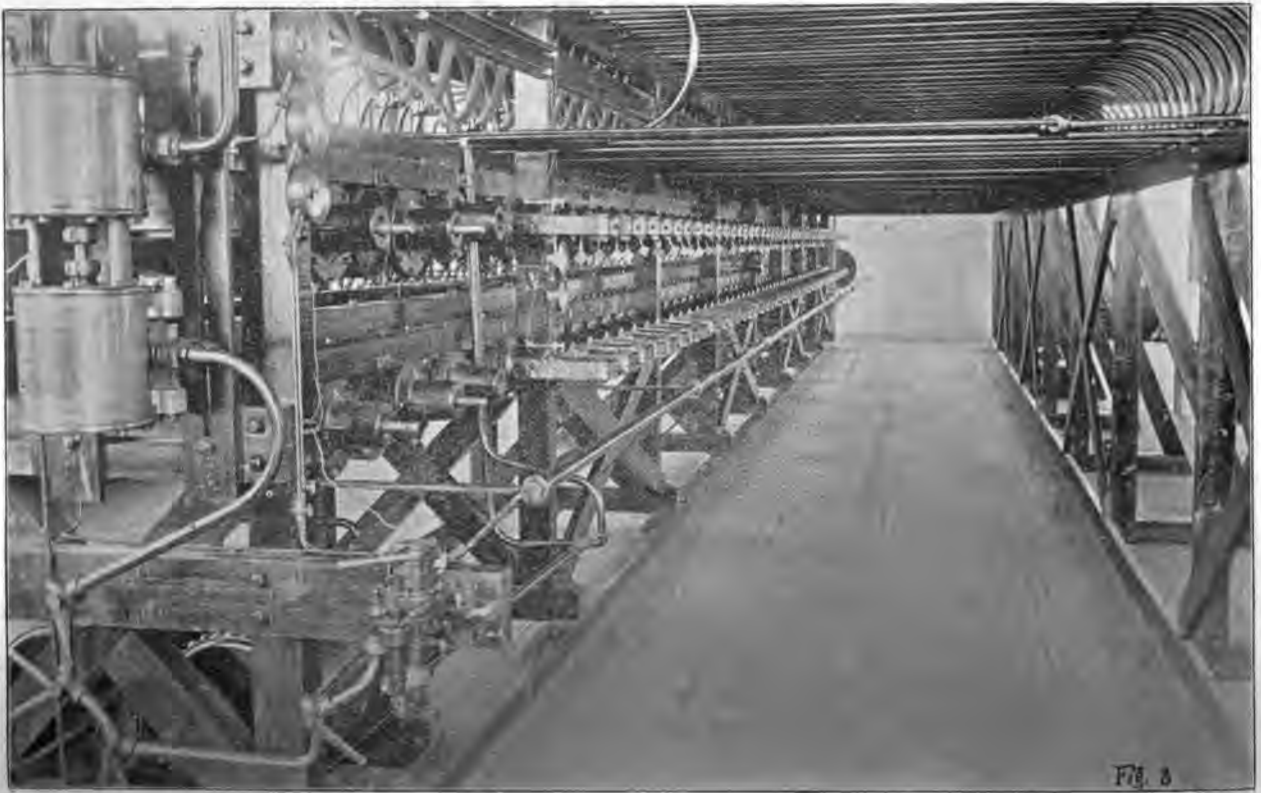


Fig. 8

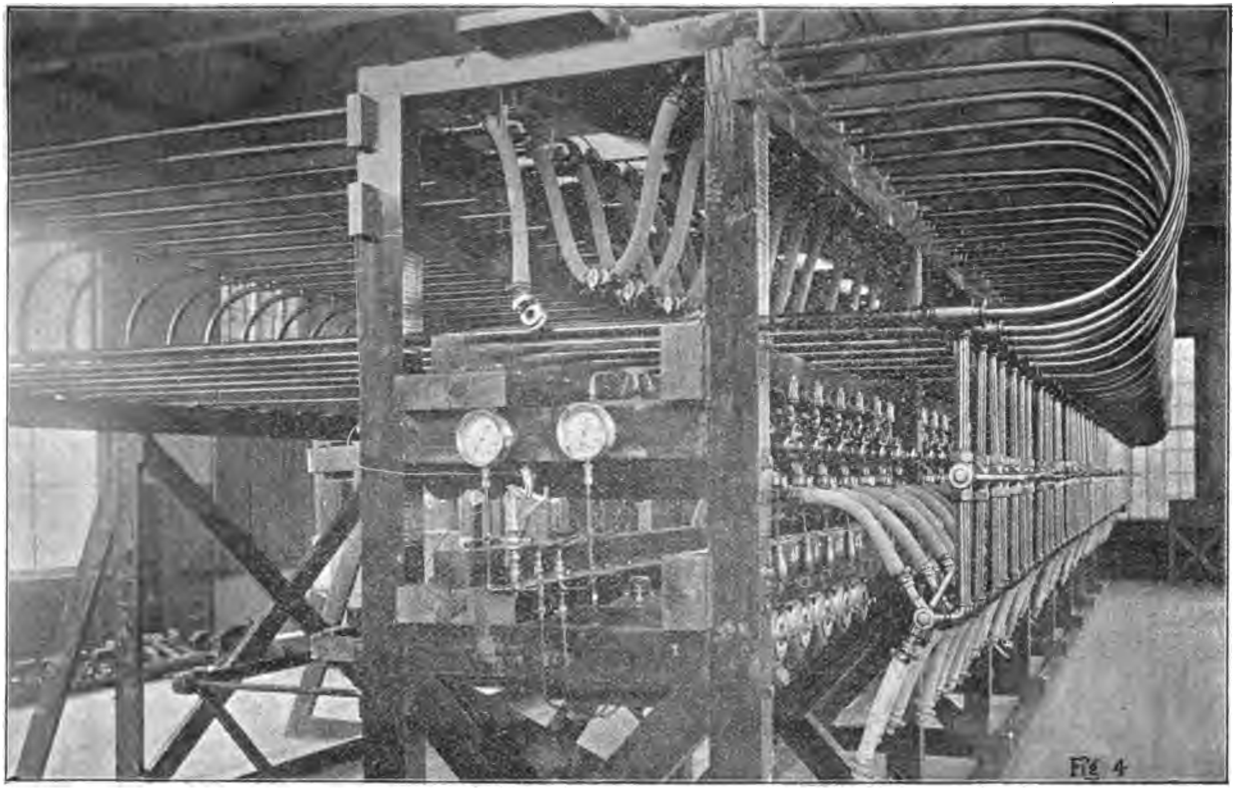


Fig 4

covering is also made; the inside of the building is sheathed with wood. In a small annex is located a vertical boiler of abundant capacity to work the air pumps and heat the building; it is constructed to carry a steam pressure of 160 pounds and is fitted with all the necessary appurtenances.

Fig. 1 is an illustration from a photograph of the building.

The main building contains at the present time one test rack upward of sixty-four feet in length, constructed of timber framing and erected to carry two sets of fifty freight air-brake cylinders and auxiliary reservoirs, each set with a complete outfit of tender and driver brakes with their auxiliary cylinders and two main reservoirs. Room is provided at one end for two air-compressing pumps and two engineer's brake valves; one of each of these only is now in place. One hundred brake cylinders and auxiliary reservoirs received from the Westinghouse Air Brake

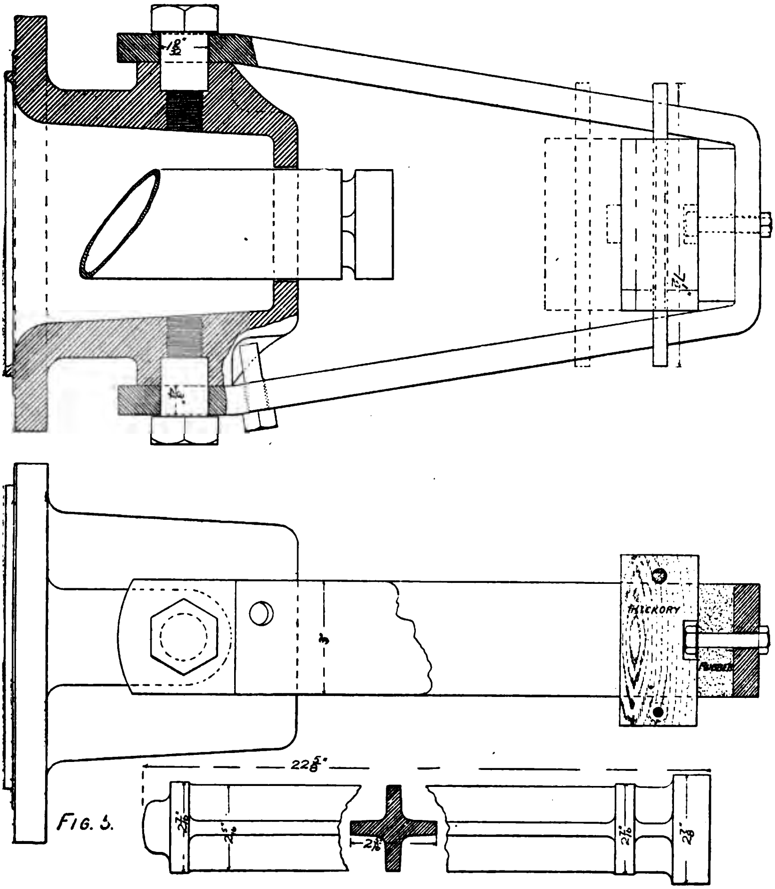


FIG. 3.

Company are placed in two horizontal rows of fifty each, one above the other; the upper set only is fitted with triple valves of the standard Westinghouse quick-acting type; the lower set is not fitted with triples, as that is the one upon which the triples which are to be tested are to be placed; both sets have, however, all the other attachments required for service. The piping is the standard for 34-foot freight cars, of the same diameter of pipe and same length of pipe as used in service; it is fitted with the standard angle cocks, air-brake hose and couplings, the standard drain cups and stop cocks, and with the same number of elbows as used in the service; the only addition is a three-way cock, shown in Fig. 2, connecting the 1-inch branch pipe with the two sets of brake cylinders. This addition was necessary, as it was concluded that in order that both sets of brakes and triples should be tested under precisely similar conditions, only one set of train pipe should be used for both. The 1-inch three-way cocks are connected to the triples by means of 1-inch rubber hose. The pipes for the engine and tender equipment are of standard size and lengths, and arranged as nearly as it was possible to do so in the same manner as used on a consolidation locomotive.

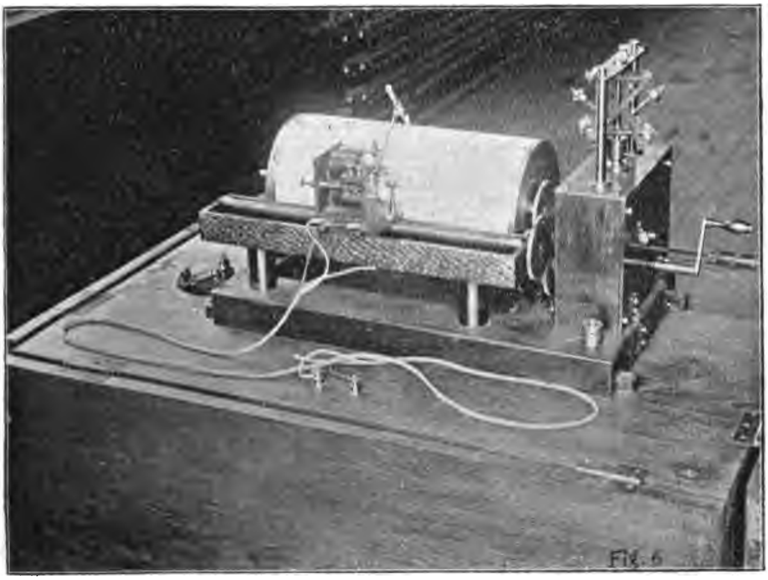


Fig. 6

The test rack containing the two sets of fifty brakes is placed to one side of the building in order that at some future time a second rack facing it may be erected in the same building and thus make it possible to test one hundred sets of brakes at one time. The arrangement of the racks with piping, etc., is shown in Figs. 3 and 4, which are illustrations from photographs and in which Fig. 3 is an interior view looking from the first car to the fiftieth and showing the upper and lower horizontal rows of cylinders; Fig. 4 is an interior view looking from the fiftieth car toward the first car and showing the double set of hose connected to the single line of piping.

In order that the provisions of the specifications for the testing of the air-brake apparatus recommended by last year's committee should be carried out, each cylinder is fitted with a device for limiting the stroke of the piston. This device consists of a hinged strap which is attached to the cylinder head and which can be thrown into a vertical position and out of the way when a full stroke of twelve inches is to be had; when the six-inch stroke is to be used the straps are thrown into a horizontal position and wooden blocks dropped into them, against which the piston rod strikes and limits the stroke. A small rubber plug is introduced in the end of the strap and

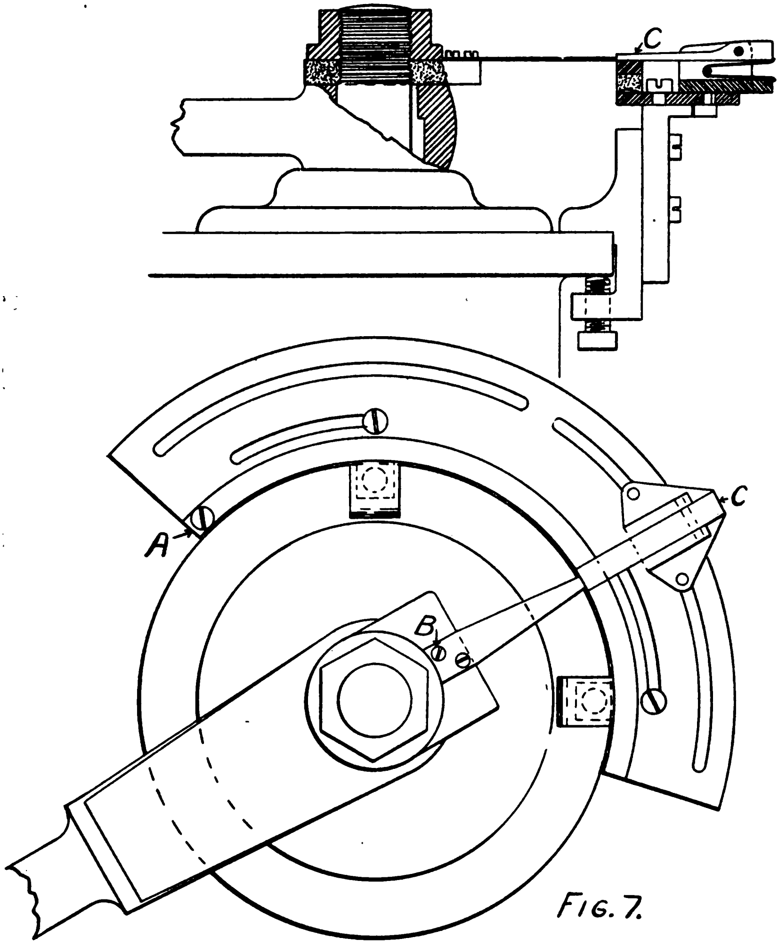


FIG. 7.

acts as a buffer and reduces the shock. To obviate the danger of fracturing the heads, the Westinghouse Air Brake Company very kindly had special heads made of extra thickness and double the number of bolts by which the head is fastened to the cylinder. The blocks used are two inches in thickness, and when it is required to limit the stroke to four inches one additional block is introduced into each strap. In order that the force of the blow should be taken directly on the piston and not on the end of the tube-shaped piston rod, special cast-iron push rods were made and introduced which offer some considerable surface at the outer end to receive the blow. When the full stroke of the piston is to be had and the straps are thrown out of the way, the push rods are removed. These details are shown in Fig. 5.

As it is necessary to obtain correct records of the time elapsing between the movement of the engineer's brake valve when applying the brake, the movement of the twenty-fifth piston, the movement of the fiftieth piston and the attainment of fifty-five pounds pressure in the fiftieth cylinder, special apparatus had to be introduced, and as these time intervals are very small it was, of course, necessary to make use of electricity for transmitting the movement of the various parts to the recording apparatus. The record is obtained by means of a chronograph, consisting of a paper-covered drum driven by a weight through a train of wheels, uniform speed of the drum being controlled by a pendulum governor; the chronograph is made by Fauth & Co., of Washington, D. C., and is of great accuracy. Fig. 6 is an illustration from a photograph. In front of the revolving drum is placed a carriage which contains the marking pen and the electro-magnet necessary for moving this pen; the carriage is moved in the direction of the axis of the drum and parallel to it by means of a screw driven by the same train of wheels which drives the drum, in such a way that were the pen not moved by the electric current it would trace a continuous spiral on the paper with which the drum is covered, which, when the paper is removed from the drum, appears as a series of parallel lines ruled upon it. In order to obtain records as nearly instantaneous as possible, a closed electric circuit is used; in other words, the various devices located upon the engineer's brake valve and the brake cylinders in transmitting the movement of the apparatus, break the otherwise continuous circuit and release the armature of the electro-magnet on the chronograph. This armature is attached to a small lever, at the other end of which is mounted the pen, and allows a spring to pull it away from the magnet every time the current is broken and the armature is released, the pen makes a corresponding movement in the opposite direction, and makes a little jog in the otherwise straight line traced on the paper drum; as the circuit is broken by the movement of the various parts of the apparatus in applying the brakes a series of jogs is traced upon the paper, and as the speed of the drum is constant, a measurement of the distance between jogs in the line indicates the time elapsing between the movement of the various parts.

The circuit-breaking device placed upon the engineer's brake valve is shown in Fig. 7, and consists of a curved metal frame attached to brackets by which it can be clamped to the engineer's brake valve, and of a contact spring which is attached to the handle of the valve. Upon the curved plate, but insulated from it, is placed another small metallic arc on which the outer end of the contact spring bears. This superimposed arc and the contact spring are both in the circuit by being attached to the line wire at the points A and B; therefore, so long as the spring remains in contact with the arc the circuit remains unbroken, and the movement of the handle of the engineer's brake valve will not be recorded on the chronograph so long as the spring and the arc remain in contact. In order to break the contact the spring is lifted up from the small arc below it; this is accomplished by means of a small plate of hard rubber marked C, which is wedge shaped at that end which bears on the arc, so that when the contact spring is moved toward the thin edge of this plate it is lifted up and breaks contact, but immediately makes it again. As the handle of the engineer's valve has to be moved back again, and it was thought desirable not to introduce the confusion of other jogs in the line on the chronograph, except those which actually show the movement of the parts of the apparatus, the contact spring on its return with the movement of the handle travels under the hard rubber plate C, which slips over it.

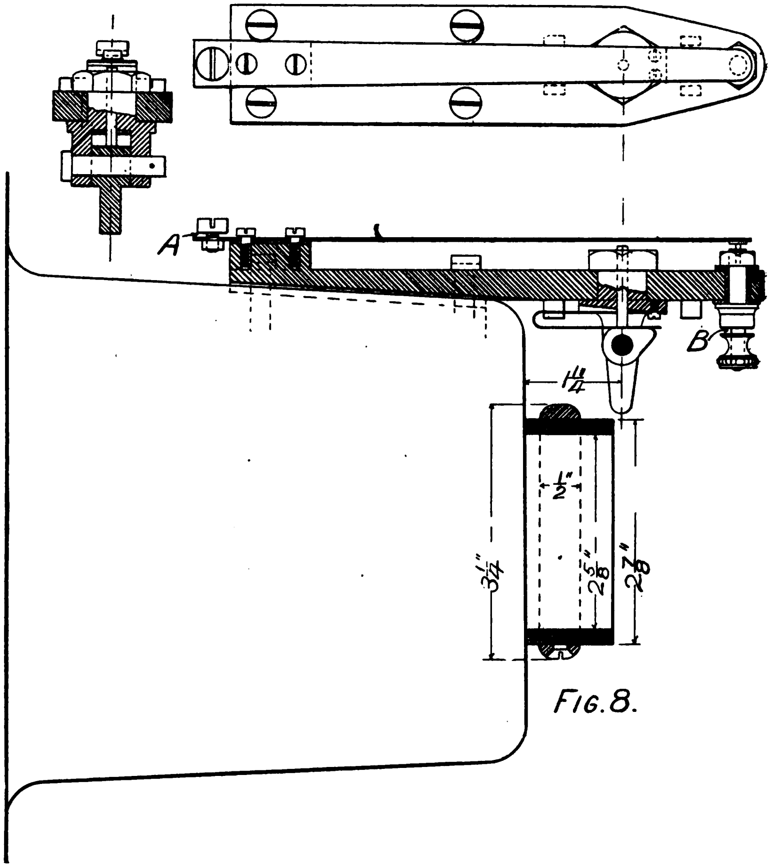


FIG. 8.

The circuit-breaking devices used on the twenty-fifth and fiftieth cylinders for recording the movement of the pistons are identical, and are shown in Fig. 8. It is placed upon the cylinder head, and consists of a strong plate attached to the cylinder head, having attached to it the various parts of the circuit-breaking apparatus. The hollow piston rod on these two cylinders has a projecting ring attached to it near the outer end. As the piston rod travels outward it comes in contact with and deflects the pendant arm of a small bell crank; the horizontal arm of the bell crank at the same time imparts a vertical movement to a small pin, which in its turn lifts a spring and breaks the electric contact which exists at the end of the spring; as soon as the ring on the piston rod has passed the bell crank, the latter is moved back again by the spring and the circuit immediately closed. The line wires are connected at the point A on the spring, and the point B on the seat, upon which the other end of the spring rests, and which forms the contact point with the latter. For the same reason that it was not desirable to have the circuit broken again when the pistons travel back and false records made on the chronograph, the bell crank is deflected in the opposite direction when the piston travels home, but produces no movement of the spring, and, therefore, does not break the circuit.

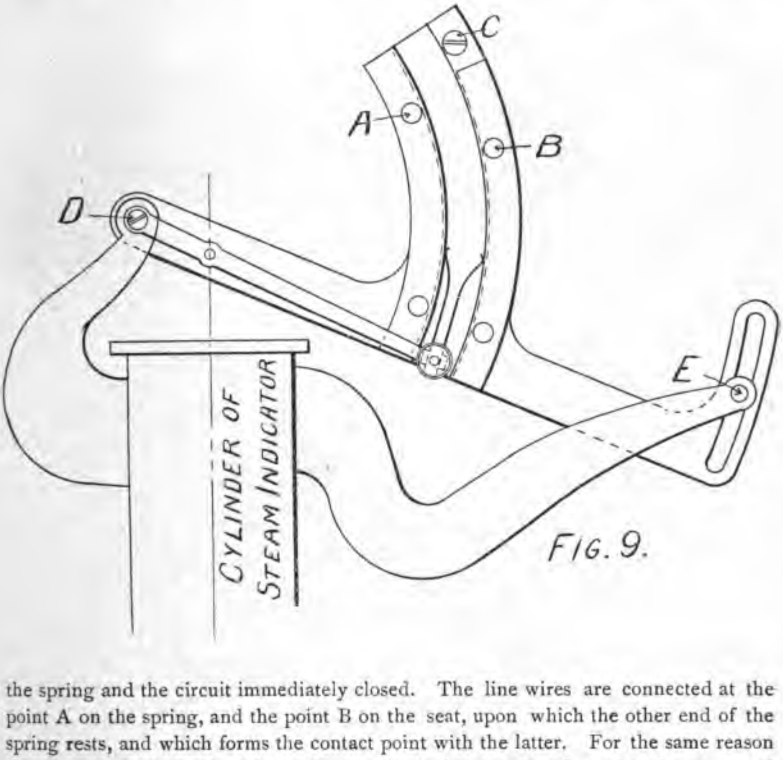
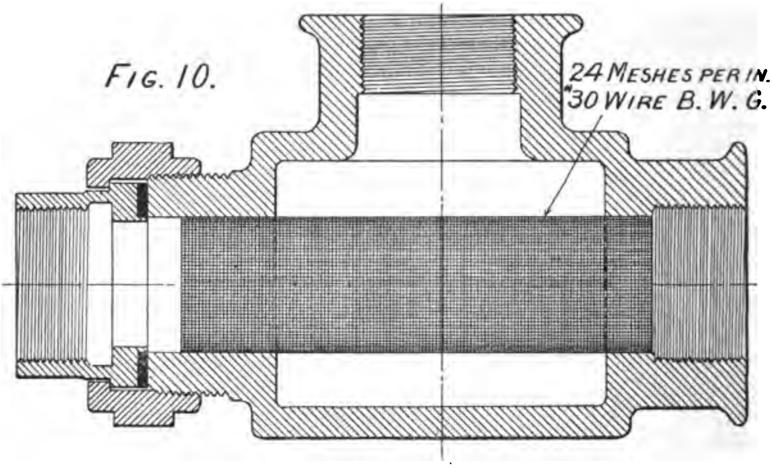


FIG. 9.

The circuit-breaking device for recording the attainment of fifty-five pounds pressure in the fiftieth air brake cylinder is shown in Fig. 9, and consists principally of an ordinary steam engine indicator with its piston and carefully graduated spring. With the increasing pressure in the cylinder the small piston in the indicator is moved upward and compresses the spring, so that equal increases of pressure result in equal compressions of the spring. The piston is attached to a lever which partakes of its movement, and at the outer end of this lever is attached a pair of delicate contact springs which travel between and bear upon two metallic arcs insulated from the frame which carries them. These arcs are in the circuit by being connected at points A and B to the line wire. At the upper end of the arc B is placed a hard rubber block C; so long as the contact springs travel between and bear upon the two

FIG. 10.



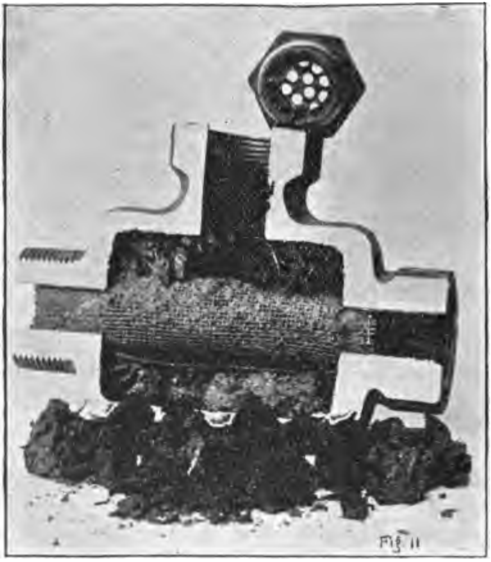


FIG. 11

metallic arcs the circuit remains unbroken, but the moment it rises above the upper end of the arc B and one spring bears upon the hard rubber block C the circuit is broken and the record made on the chronograph. The frame which carries the metallic arcs is pivoted at D to the frame of the indicator and the other end is adjustable at the point E and can be set to any position, so that it is possible to obtain record on the chronograph of the time at which any pressure is reached in the fiftieth cylinder. This, therefore, enables very careful adjustment to be made.

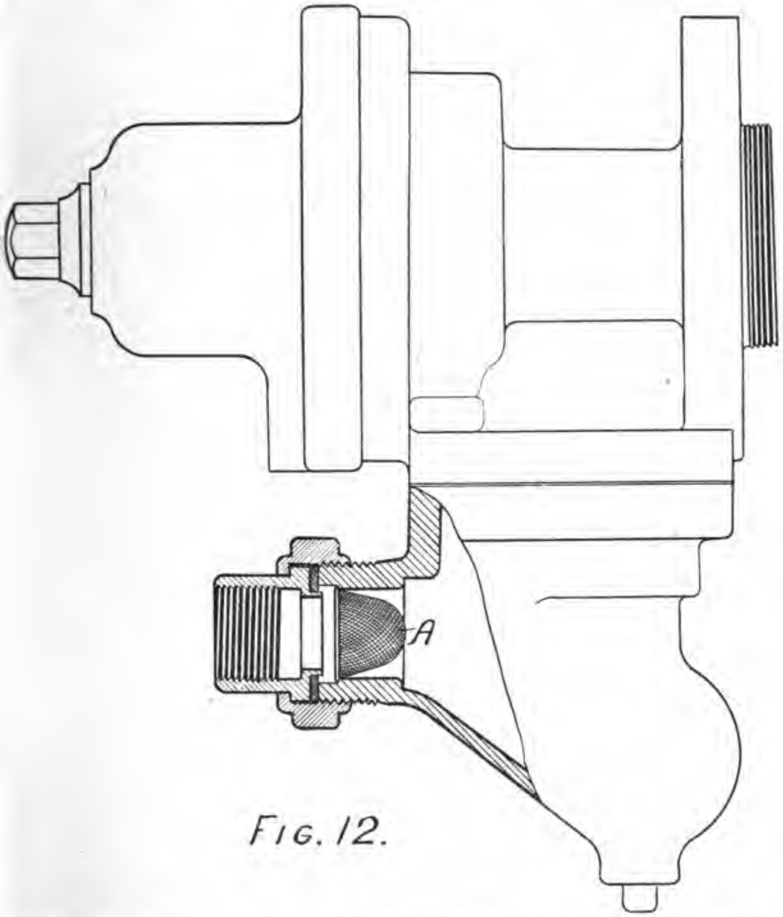


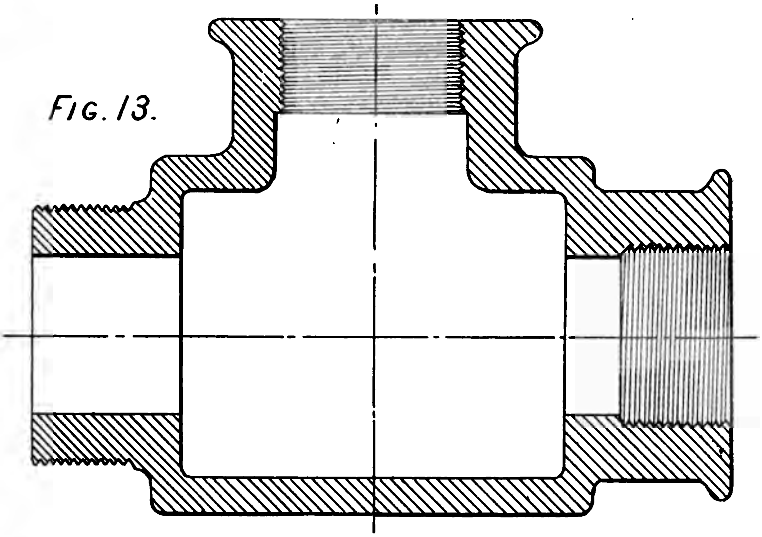
FIG. 12.

Besides the apparatus above described, the rack is fitted with the requisite number of gauges as required on the cylinder and auxiliary reservoir of the first, twenty-fifth and fiftieth cars.

Your committee last year submitted for consideration a schedule or table entitled

"Standard of Efficiency of Air Brakes." It was not recommended for adoption by the Association. The tables were intended only as an outline to be worked over and improved upon; nor is your committee prepared at the present time to submit any final recommendation. The inauguration of the World's Fair has stirred the different air brake companies up to the importance of becoming exhibitors and showing their apparatus in operation as nearly as can be under similar conditions to actual train service. The thousands of railroad men who attend the World's Fair this year will find a most wonderful exhibit of quick-action air brakes and recording apparatus, the latter so essential in measuring performances the value of which is computed in seconds and fractions of a second. Four brake companies have exhibits of racks represented as being the equivalent of different numbers of 34-feet cars in service. Two companies show the equivalent of fifty cars, and two actually show the equivalent of one hundred cars. Such an opportunity for investigating the relative merits of so delicate a device has never before been presented to mechanics. These devices will be on exhibition six months. It is expected that much information will be gathered through the various experts who will examine them during the coming summer. It is well known that additional cars magnify defects in brakes that are not apparent in a small number. Your committee's rack so far is provided for but fifty cars. In view of the information likely to be gathered from these World's Fair exhibits it was therefore thought prudent not to attempt at establishing a final "Standard of Efficiency" at the present time, but to report progress, ask to be continued and defer a final report until 1894.

FIG. 13.



There are other matters, however, in investigations of this kind which must not be lost sight of. In the assignment of duty to your committee it will be observed that much stress is laid on the importance of carrying on the brake investigation in such a way as will insure "the best available service." Shop investigations are very important, but they are of little value unless associated with tests of service. Some of the best and most ingenious devices that have been invented have been ruined by

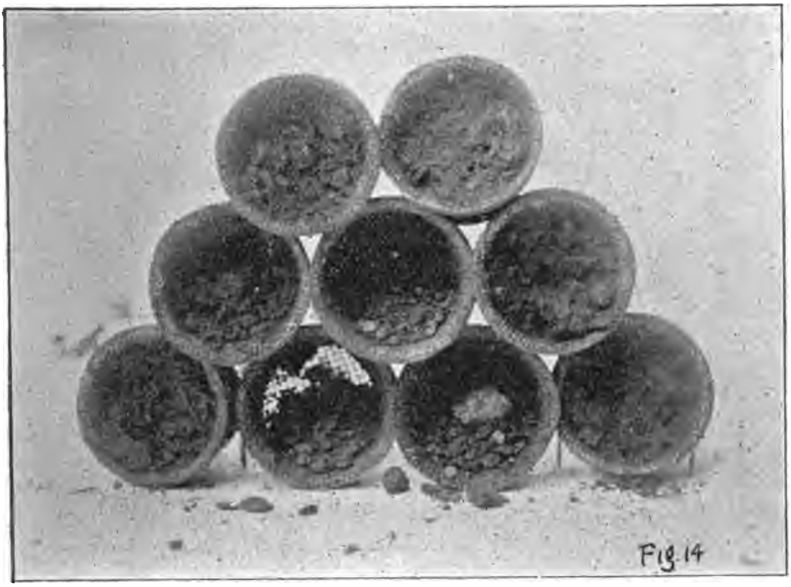


Fig. 14

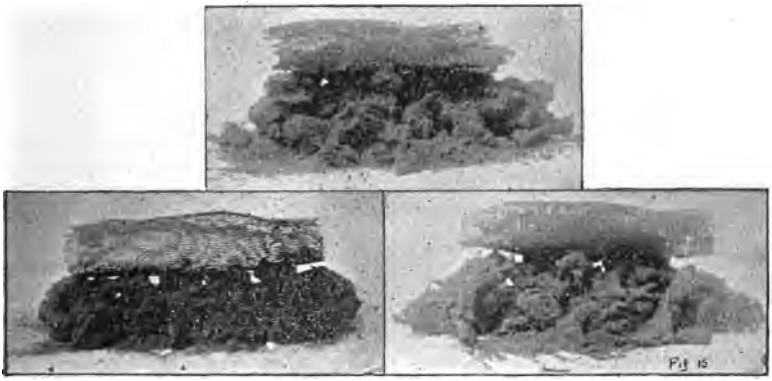


Fig 15

neglect. Let us, then, consider whether there are any tests of air-brake service that should be claiming our attention. At this meeting we have representatives from almost every railroad company in this country. Only once a year are we privileged to criticise and to personally call each other's attention to details of practice. This will always be one of the great advantages of the Association, for it is through our members that we are able to reach the thousands of men on whose care and attention to maintenance depends largely the success and usefulness of the various measures and devices we as a body have indorsed.

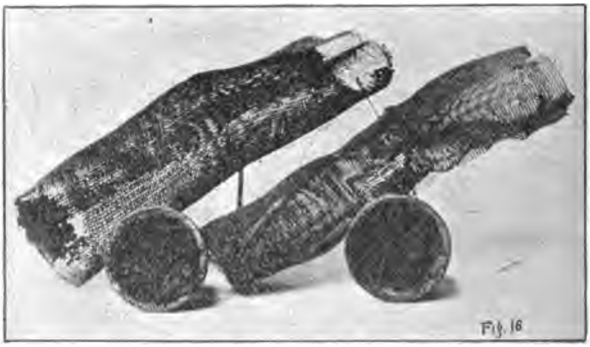


Fig. 16

The mechanism of the triple valve is fine and delicate, and if not properly cared for will for obvious reasons soon become inefficient. Various efforts have been made to keep the dust, dirt and rust that accumulate in the train pipe out of these delicate parts. The first attempt at keeping this dirt out of the triple we find

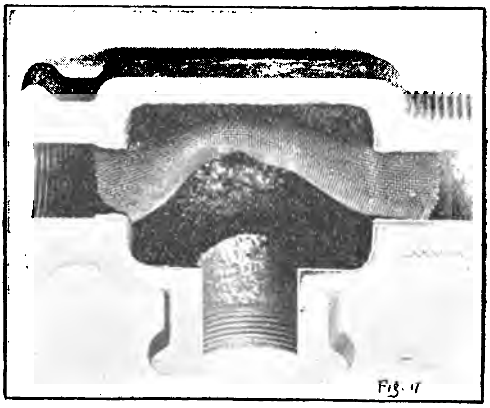


Fig. 17

in a horizontal or vertical screen located in what is known as the train-pipe drain cup, as shown in Fig. 10. Formerly this drain cup was packed all around the screen with small pieces of sponge. Fig. 11 shows one of these drain cups; it is packed with sponge all around the screen. The sponge has become so solid it is difficult to pick out. A perforated brush is intended to prevent the sponge from going into the pipe leading to the triple. At the entrance to the triple, as a further precaution, we find a cup-shaped screen, as indicated in Fig. 12 at A. With the advent of the quick-action brake it was found very essential to reconstruct the train pipe and its connections, removing all sharp corners, angles and obstructions that existed, the sponge in the drain cup among other things being banished as not conducive to quick action. Either through neglect or through zeal in the pursuit of quick action, some drain cups have been put in service not only without sponge but without any screen, as shown in Fig. 13. Let us see the effect of this by examining some triple screens that were removed from freight cars so fitted after a few months' service by one of the members of your committee, shown in Fig. 14. It will be observed that the screens are packed in some cases perfectly solid with dry mud and dirt, so that it is

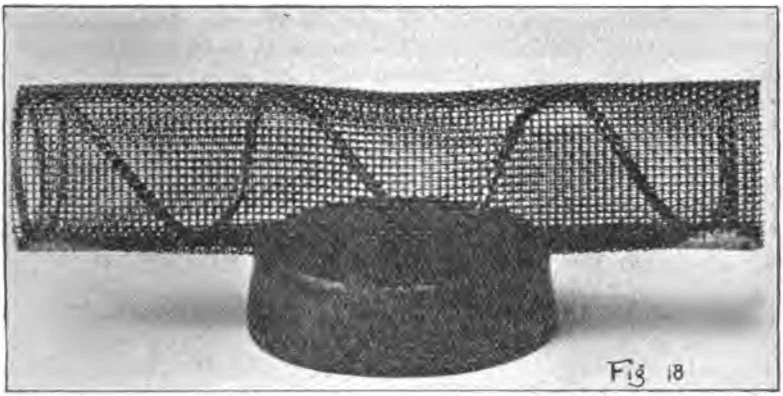


Fig 18

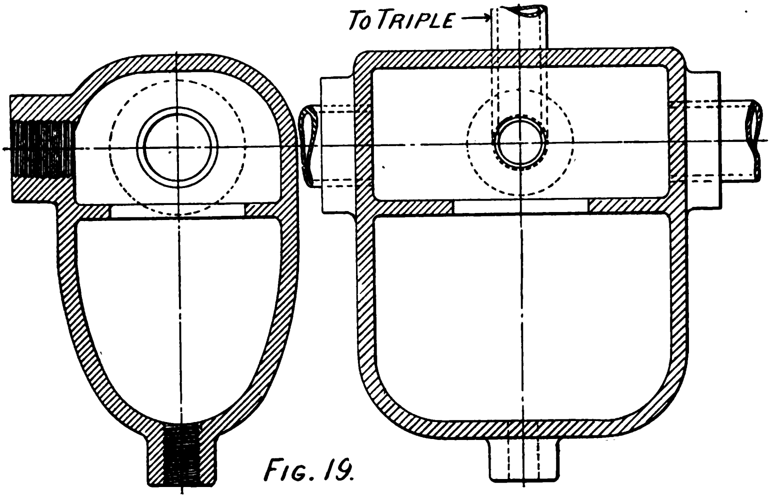


Fig. 19.

impossible for any air to pass through them. The composition of the material seems to be chiefly dust, pipe scale and rust. In one case you will observe a chunk of coal about ⅝-inch long and approximately cubical. Clearly, then, it is not desirable to do away with the screen in the drain cup, and the screen at the entrance of the triple is also a most important auxiliary in contributing methods for the best available brake service, but how many of our inspectors would miss this screen if triples were issued to them without the screen? A case has come to the attention of your committee where twenty triples were inadvertently issued at one shop without any screens, and everyone was put in service without the screen. With such carelessness and want of attention is it any wonder that brakes are sometimes reported as not working?

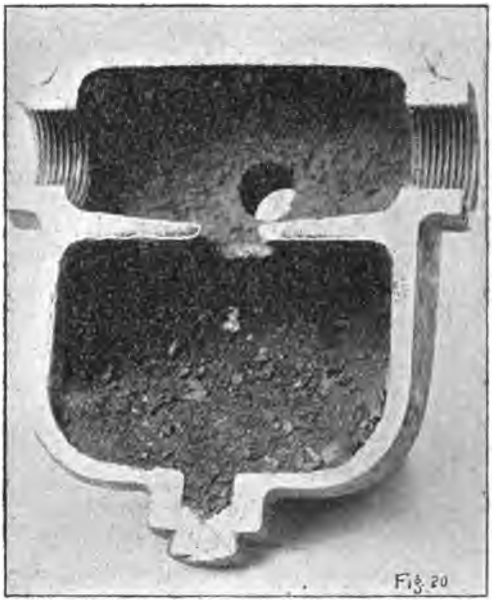


Fig. 20

Let us, however, return to the consideration of the drain cup. We hope, through this exhibition of triple valve screens removed from triples not protected with drain cup screens, we have succeeded in showing how important a part a properly screened drain cup plays in the successful working of a quick-action air brake. It must be borne in mind, however, that everything eventually wears out on a railroad, and the master car-builder who allows the screens in his drain cups to run without any inspection or attention must not expect any better results than is obtained from those that are allowed to run without any screens. Those of us who examine into this will find that the netting rusts and cuts out, and filth accumulates in quantities that is almost beyond belief. Fig. 15, from photographs, shows the collapsed condition into which screens get when they become gummed up and worn out. It also shows the fine condition the sponge gets into when by long service it is thoroughly mixed with rust, oil and dirt. All sponge should be removed at once from drain cups, not only from freight cars but from passenger cars.

Fig. 16 shows two triple screens removed from triples that had drain cups originally fitted with screens without sponge, but the screens had become misplaced. Apparently the screens were too long and were bent when the piping was screwed up. They were in this bent and flattened condition when removed from the drain cups. Air and dirt passed by without going through the screen, the result being shown by the condition of the triple screens. They are packed solid with dirt, and are just as bad as those shown in Fig. 16. Fig. 17 is a very interesting case; it shows a screen still in position, but which from some cause has collapsed and partly assumed an upward position, and is rapidly getting coated over with rust and dirt. Fig. 18 shows a method by which this collapsing of screens might be averted. It will be observed that this is accomplished by simply inserting a piece of coiled wire. The arrangement is not patented, and anyone may use it.

Fig. 19 shows the tank drain cup which, as you know, is not fitted with the quick-action brake. Up to the present time, we believe, there has been no attempt on the part of any of the brake companies to use screens in tank drain cups. The lower cavity is supposed to collect all passing dirt and water, and this is intended to be removed by blowing off through the small pet cock. In practice we believe it will be found that the opening to the pet cock soon stops up, the cavity fills up with mud and dirt, and the drip cup is then of practically no value. Fig. 20 shows one of these cups as removed from a tank of an engine on the C. B. & Q. R. R. It will be observed the cock is gone and the hole plugged with dirt, and the cup well-filled with dust and dirt. That this dirt will work its way into the triple must be evident from the illustrations already cited.

To sum up, we advise as follows:

First.— Remove all sponge from drain cups.

Second.— See that screens in drain cups and in triples are properly maintained and of proper mesh.

Third.— Apply screens to all tank drain cups.

G. W. RHODES,
S. P. BUSH,
GEORGE GIBBS,
A. S. VOGT,
E. A. WILLIAMS,
Committee.

AURORA, Ill., June 15, 1893.

MR. WAITT: I would move that this very valuable report of the committee be received and printed in the Proceedings, and that a copy of the report be furnished to each of the members by the Secretary as soon as it can be printed, and that the committee be continued.

MR. ADAMS: I think, Mr. President, I would like to have all these defective screens and drain cups and dirt, etc., illustrated, if it is possible to do it, and have it inserted in the minutes. There is not one, probably, in a hundred that realizes in the least the existence of what has been presented to us today, and if it could be illustrated completely in our minutes it would be brought to their attention.

MR. CLOUD: We can photograph the small screens without any trouble, and I think probably we could get something from the dirt if the material is kept with the piece in which it goes, and if the members will not disarrange them in looking at them.

MR. RHODES: They are arranged so that they need not be disturbed in any way, and I think it would be as easy to make photographs of them as it was to photograph the wheel defects last year. It would not be much expense and it would bring it home to men who are caring for them more than would anything else.

The motion was carried.

MR. BISSELL: Before this matter is passed over entirely I think it is due to the Pennsylvania Railroad Company as well as this committee that we express to them by a hearty vote of thanks our appreciation of the great interest they have taken in developing this wonderful affair of the air brake. The more we see of it the more we see how little we know about it. There is no one here today outside of this committee, I suppose, who dreamed of the dirt and the obstruction to the work of the brake that may be inside of it. I must confess that I am astonished. I would say with regard to this committee, and other committees who reported here today, that we have reason to be thankful that we have such men among us as Godfrey W. Rhodes and some other men here who will go to the labor to demonstrate in a scientific way these truths. Since I have been here I can speak the sentiments of a great many that did not give their reports on these questions brought up. It is said that confession is good for the soul, and I feel that my soul must need a good deal of confession. I feel that each and every member of the institution commits a great wrong if he fails to take particular pains to interest himself to the extent of giving all the information that is necessary and desirable to present to the Association respecting the subjects that are here brought up. I did not feel that I should go away feeling just right unless I acknowledged that I had been delinquent in this respect, and I believe that each one here today feels that we ought to take more personal interest and work more for the good of the cause. Nothing in this broad land is of more importance; nothing of more interest to the general public and the whole people. My motion was that we return thanks to the Pennsylvania Railroad.

THE PRESIDENT: It is moved and seconded that the thanks of the Association be extended to the committee and to the Pennsylvania Railroad for furnishing facilities to make air-brake tests.

The motion was carried.

THE PRESIDENT: We will now hear the report of Committee No. 12 on Steel Center Sills.

MR. BARNES: I would like to say, before reading this report, that what appears in it is the unanimous opinion of the committee. Each of us had individual opinions which were not put in, because they were not unanimous. I would like also to say that you will find little in the report about steel center sills, because I can find no case where anyone has ever built a car with steel center sills without a whole steel under-frame. Therefore we had to include the steel frame as a whole.

Mr. Barnes then read the following report:

REPORT OF THE COMMITTEE ON STEEL CENTER SILLS FOR FREIGHT CARS.

To the President and Members of the Master Car-Builders' Association:

The experience in this country with metal center sills and metal under-frames is quite limited, and it is impossible to gather from it much that is definite or conclusive. The experience here has been confined to the following:

Metal under-frames for locomotive tenders.

Several metal under-frames on the New York Central and the Lake Shore & Michigan Southern roads.

Sixty cars of the first type built by the Harvey Steel Car Company, used principally on the Chicago, Milwaukee & St. Paul Railroad.

Several tank, box and gondola cars recently built by the Harvey Steel Car Company, on an improved plan, from designs of Mr. J. D. McIlwain.

Various special cars for unusual freight, built by several railroads, principally the Pennsylvania.

The Michigan Central Railroad has made an investigation of the subject, and has proposed a metal under-frame from designs of Mr. Robert Miller, General Superintendent; Mr. E. D. Bronner, Superintendent Car Department, and Mr. Robert P. Lamont, Mechanical Engineer. Several designs have been made by the Fox Solid Pressed Steel Company, of Joliet, for cars for the Illinois Steel Company.

A considerable number of cars have been built with iron pipe under-frames, but these are scarcely practicable and are not of a type that would ever be generally used, and therefore have been omitted from this report.

Nothing has resulted from the experience of those who have been using the above mentioned cars that leads to a strong conviction for or against the use of steel center sills. It has, however, been found on the Lake Shore road that running repairs are much less with the steel under-frames. Steel tender frames have been annoying in repairs, not on account of the total cost, but because when the tender is disabled the locomotive to which it belongs has to be taken from service. But few tenders are kept for extras, and owing to the delays incident to repairing steel tender frames they are not considered favorably by the majority of railroad men; but as steel frames for tenders are stronger than wooden ones, and by their increased strength and durability have reduced repairs, there are some who believe them to be more desirable than wooden frames. One marked advantage has been found in the freedom from decay. It is practically impossible to make a steel tender frame that will not be distorted more or less in such collisions and wrecks as break up and damage wooden ones. Hence, a logical conclusion is that the delay in repairing steel under-frames makes them less practicable than wooden frames for locomotive tenders under the present method of operating locomotives. With freight cars, of course, the case is different, as the delay in repairing freight cars does not extend to locomotive equipment.

What precedes is practically the entire result of experience in this country with steel center sills and under-frames.

In England, where wooden under-frames are very much heavier in proportion to the carrying capacity of the cars than is common practice here, steel under-frames are gradually being introduced, both for freight and passenger cars. The reports of service are very decidedly in favor of metal under-frames.

In Germany, Belgium, Sweden, Norway, Russia, France, India, and on some roads in Mexico, and in nearly all foreign countries, the metal under-frame is regular standard practice. Perhaps no argument is necessary to show that, in countries like Germany and France, where the cost of repairs to cars has been reduced to a point below the cost in other countries, the maintenance of a metal under-frame costs less, under the conditions of operation there existing, than the maintenance of wooden frames. Frequent reports by the government railway officers of France and Germany prove beyond doubt that metal under-frames, for both passenger and freight cars, are more economical and better adapted for service in those countries than wooden ones, and further discussion of this point has been omitted, believing that the statement would be accepted without more evidence, and this report has been more particularly confined to descriptions of typical designs of metal frames used in various countries.

The advantages that may be expected from the use of metal center sills lie almost solely in the increased durability and the reduced cost of inspection. A metal center sill, when it is properly made, is the equivalent of a continuous drawbar arrangement from end to end of the car; and being composed of material having a high tensile strength, steel center sills can be readily made so secure as to require but little inspection. The center sills of a car and the draft rigging attachment are the parts of the car body which require the most attention from car inspectors, and cost more to maintain than other parts of the car body; therefore, it might be expected that the introduction of steel center sills would reduce the cost of running repairs.

In case of wrecks, it is a question whether the steel center sills would not be more expensive to repair than wooden ones, but the total cost of repairs to center sills and draft riggings caused by the class of wrecks which would seriously damage a steel center sill is not very large; and although the use of a steel center sill might increase materially the cost of repairing center sills after bad wrecks, yet, owing to the fact that on a well-appointed road bad wrecks are not numerous, the result would not be an increase in the total cost of all repairs; in fact, the greater durability of a suitable steel center sill ought to so reduce running repairs as to give a decrease in the total cost of all repairs to car bodies. It is, of course, true that wooden sills frequently last for fifteen years where the cars receive reasonably good service; but the present tendency is to use a sub-sill the entire length of the car to prevent damage to top and draft sills. With the present heavy equipment the result of this is that the total weight and cost of a car is greater with the present construction of wood than it would be with steel center sills at the prices at which steel is now offered. In any considerable quantity, steel sills can be purchased for less than 2 cents per pound.

An examination of existing designs and a review of the experience of those who have been in direct contact with the repairing of steel under-frames, indicates that the following are some of the essential features of metal under-frame construction:

First.—All joints should have sufficient area and rivets and bolts sufficient in size and number to prevent movement of the parts one upon the other when the cars are in service.

Second.—All joints should be so designed as to permit repairs to be made with the least possible delay and manipulation, and if possible without heating.

Third.—As far as possible the center sills should be continuous from end to end of the car.

The following is a list of the drawings accompanying this report:

Figures 1, 2 and 3. Harvey box and gondola car sills.

Figure 4. Detail of center sill, Harvey box car.

Figure 5. Detail of center sill, Harvey tank car.

Figures 6, 7, 8 and 9. Steel under-frames on Lake Shore & Michigan Southern Railroad.

Figures 10, 11, 12 and 13. Standard German steel under-frame.

Figures 14, 15 and 16. Standard under-frame of pressed steel, State Railroads of India. (Fox process.)

Figures 17, 18 and 19. English pressed steel under-frames. (Fox process.)

Figure 21. Pressed steel under-frame for Great Indian Peninsula Railway Company. (Fox process.)

D. L. BARNES,
J. N. BARR,
J. D. MCILWAIN,
Committee.

CHICAGO, June 5, 1893.

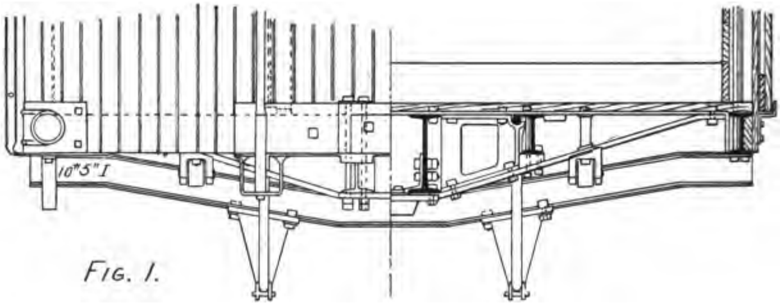


FIG. 1.

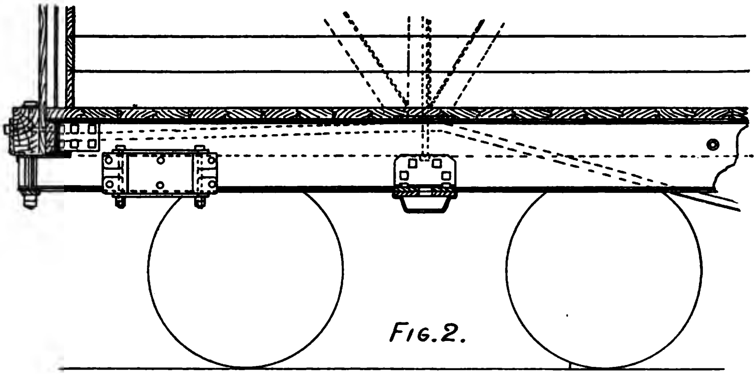


FIG. 2.

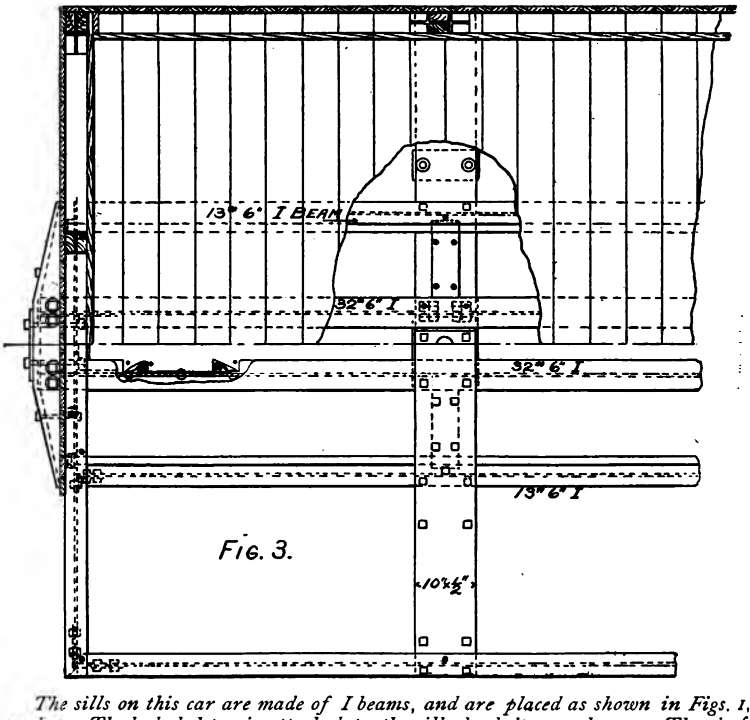


FIG. 3.

The sills on this car are made of I beams, and are placed as shown in Figs. 1, 2 and 3. The body bolster is attached to the sills by bolts, as shown. The draft attachments are riveted to the sills, as shown in Figs. 2 and 3. The end sills are of I beams, and provided with a wooden buffer stop, as shown.

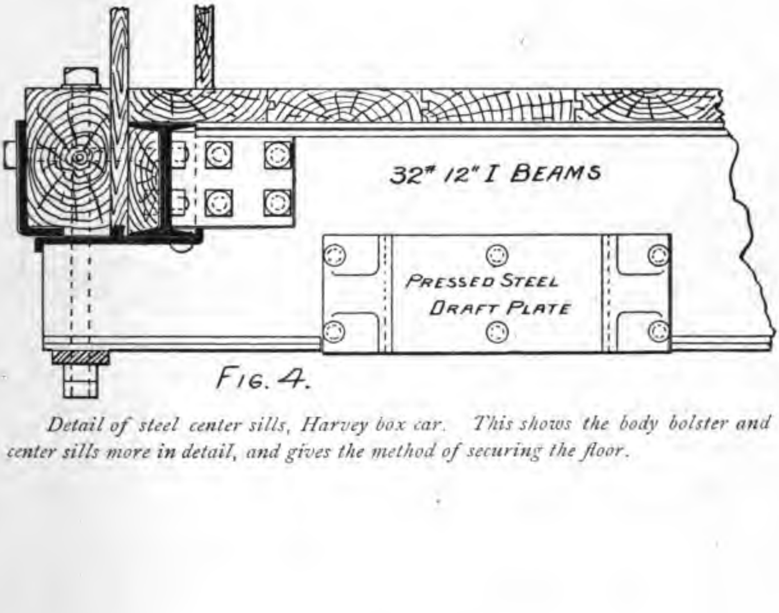


FIG. 4.

Detail of steel center sills, Harvey box car. This shows the body bolster and center sills more in detail, and gives the method of securing the floor.

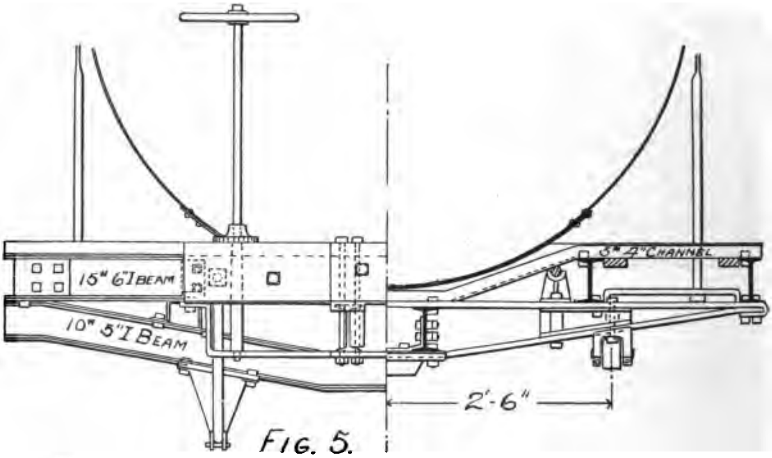
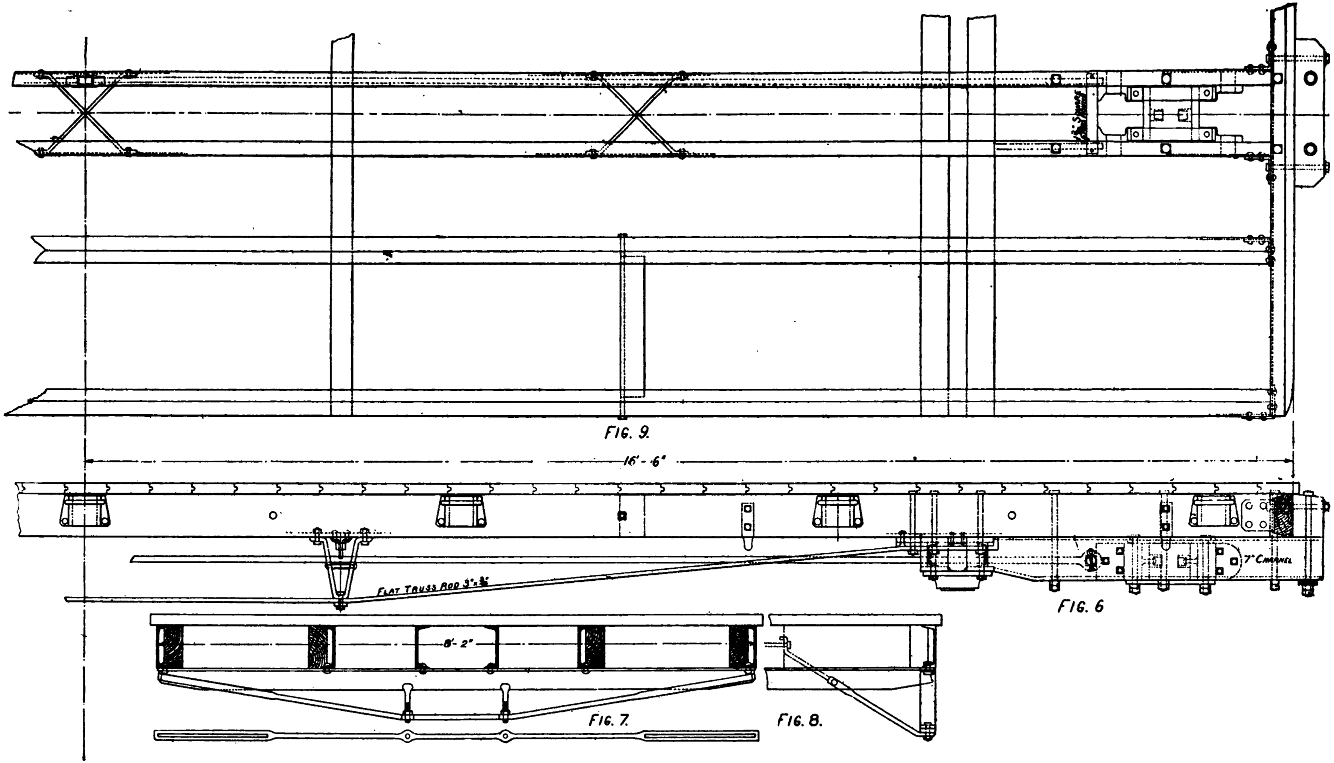
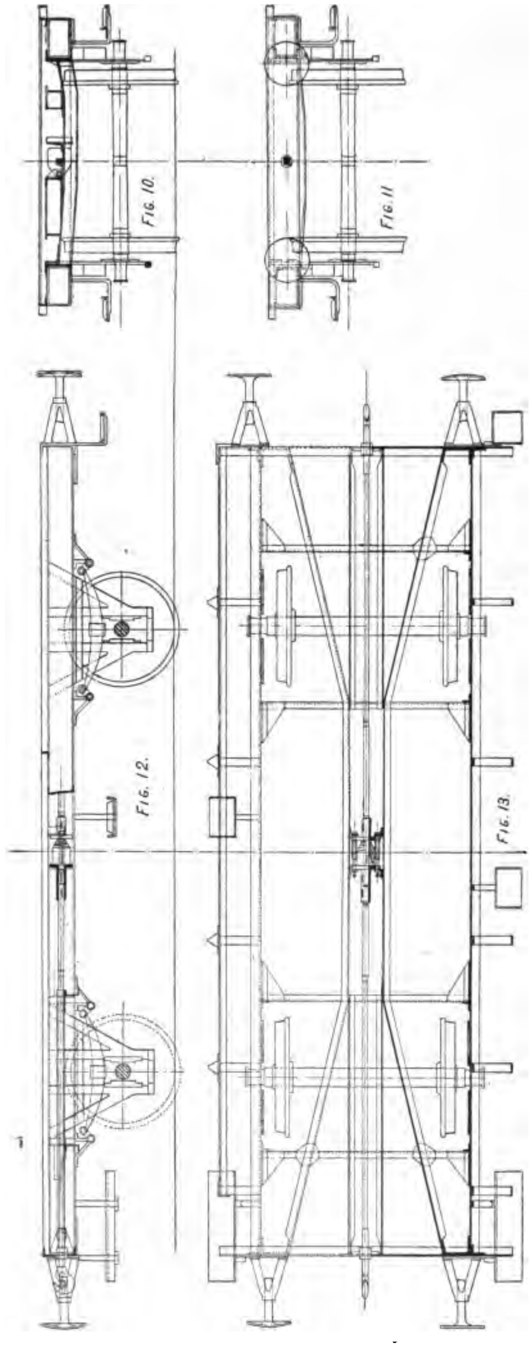


FIG. 5.

This shows the arrangement of I beam center sills on the Harvey tank car. The arrangement is in general the same as for the box and gondola car.



Steel under-frames used on the Lake Shore & Michigan Southern Railroad. These under-frames are made of rolled channels, all parts riveted together.



Standard German steel under-frame. **These under-frames are made of rolled channels, all parts riveted together.**

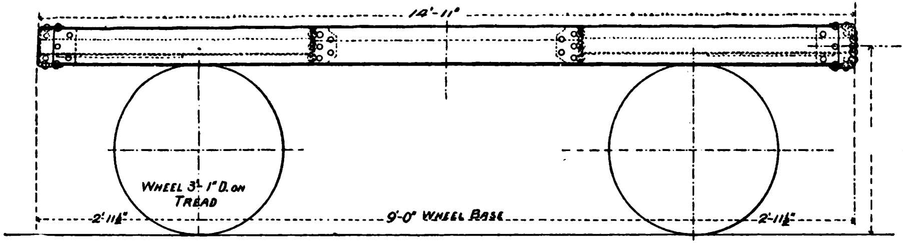


FIG 14.

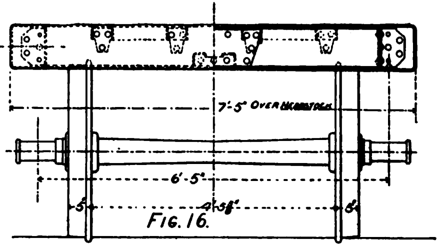


FIG. 16.

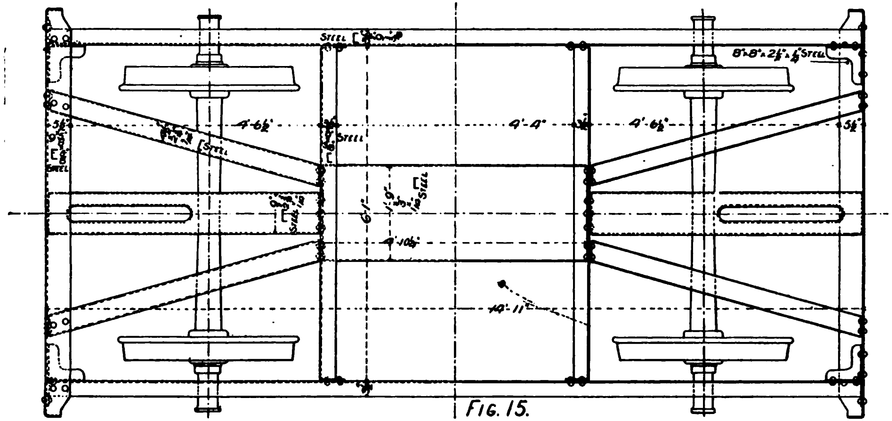
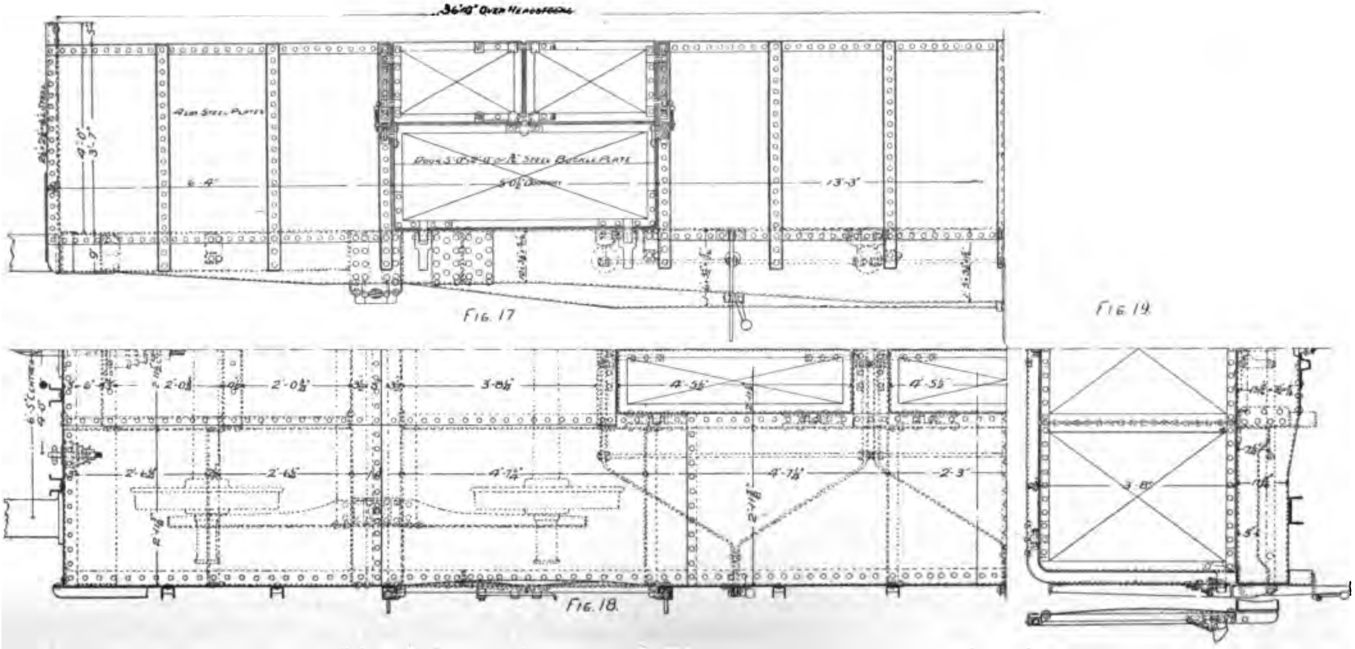


FIG. 15.

Standard under-frame, State Railroads of India ; Fox solid pressed steel. All parts riveted together.



English pressed steel under-frame for four-wheel cars. All joints riveted together.

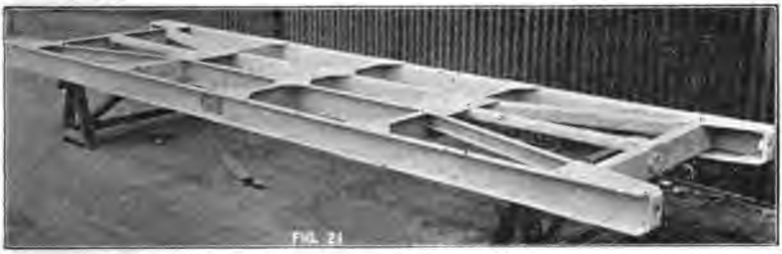


FIG. 21

Pressed steel under-frame for Great Indian Peninsula Railway Company.

Mr. Barnes : Since preparing the report I have been enabled to gather some statistics that bear upon the matter. I find that the total cost of maintenance due to wrecks is about six per cent, three per cent of which is due to the loss of cars as a whole and the replacement of cars broken up. This leaves three per cent only for the total cost of maintenance due to wrecks that applies to repairing cars after wrecks. Therefore it is clear that while many have claimed that the main objection to steel under-frames lies in the cost of repairing after wrecks, yet it is true that the cost of maintenance due to wrecks is so small that any substantial increase in durability due to steel sills would more than overbalance any cost that might result from the increase of repairs to steel center sills in wrecks. In fact a very small saving in percentage of cost of total maintenance due to the use of steel sills would vastly overbalance any increased cost due to the difficulty of repairs after wrecks.

The drawings are already described in the report, except one error. Figs. 14, 15 and 16 have the wrong title. They should be reversed, and 17, 18 and 19 be used instead.

It has been said that corner collisions are common, and that in the case of the use of steel under-frames there would be much difficulty in repairing the frames after such collisions, but as far as steel center sills are concerned, there would be no change in the cost of repairs, for center sills are not affected by corner collisions, and this report refers more particularly to steel center sills. The main point of difference in the committee has been on the question of riveted or bolted joints. I stand alone in favoring a riveted joint, as I firmly believe that no thin material should ever be joined without rivets; bolts so quickly break loose where the material is not of considerable thickness. In no class of engineering work that I am familiar with are bolts used for thin material, and this opinion is borne out by the report of the Truck Committee given here today.

The President : I would say, gentlemen, that I wanted to expedite matters, and I asked Mr. Barnes to read his report at this time, but I do not think we are quite through with the air brake report yet.

Mr. Marshall : I would make a motion that the report of the Committee on Steel Frames be accepted and printed in the minutes.

The motion was carried.

Mr. Sanderson : I would just like to say in regard to that one matter of bolting and riveting for securing the parts of such plates together, that my own experience in the matter has been very limited, but we use under the engine tenders iron distance castings between the channel iron transoms. The tenders were all first fitted up with bolts. But it was impossible to keep them tight. We took the bolts out and riveted them, and a hot rivet driven in well and well headed up will stay tight where a fitted bolt will not stay.

THE PRESIDENT: If there is no further discussion we will return to the report on brake tests.

MR. MARSHALL: The motion has already been carried, I believe, that the report of the Air Brake Committee be printed and distributed as soon as possible. I think it would be very useful if in addition to that a statement were printed to contain the portion of the report which relates to the condition and care of air brakes in service. I would, therefore, make a motion that such a statement be printed in equal number to the number of Rules of Interchange, and that they be distributed to the various roads in the same number as the number of Rules of Interchange they order. That would enable us all to put those reports, which I think very valuable, in the hands of our inspectors and others interested in the subject.

The motion was seconded.

MR. CLOUD: The motion is that a statement be printed separately embodying that portion of the report of the Air Brake Committee which relates to the condition of and repair of air brakes in service, and that a sufficient number of these be printed to enable the Secretary to distribute them when he fills orders for the Rules of Interchange, in equal numbers.

MR. MARSHALL: I did not mean to wait until the Rules of Interchange be sent out.

MR. CLOUD: The Rules of Interchange will be ready in about a month.

MR. MARSHALL: Then that would suit.

MR. LEWIS: I would offer as an amendment to that, that in place of being published separately as a supplement, that they be added to or included in the Rules of Interchange.

MR. CLOUD: Will not that make the Rules of Interchange rather bulky?

Mr. Marshall: I think it would be a great mistake to incorporate anything of that nature in the Rules of Interchange, and I do not think it would be fair to accept that amendment.

The motion was carried.

The President: If there is nothing further on the air brake question we will hear the report of the Committee on Steam Heating, if they have any report to make.

Mr. Cloud: No report on that subject has been handed to the Secretary.

The President: Mr. Paxson is chairman of that committee. The other members are Mr. Hennessey, Mr. Townsend, Mr. Hodge and Mr. White. We would be glad to hear from any one of those gentlemen.

Mr. Townsend: I did not know that I was on the committee until I got the notice from Mr. Cloud about three or four weeks ago.

Mr. Cloud: I would say that every member of this committee, as of all other committees, was notified nearly a year ago of his appointment, and I think that the notice to Mr. Townsend must have miscarried in the mails if he did not receive it until three or four weeks ago.

Mr. Hennessey: As one of the committee I received the Secretary's notice, and I also received a notice from the chairman of the committee calling a meeting in New York. It was impossible for me to attend. I supposed that the other members were prepared to attend to it in first-class shape. Like Mr. Bissell, I will confess my share of the guilt in the matter.

The President: The Committee on Steam Heating has no report. This ends all the reports of the regular committees. I wish to congratulate the members on the very valuable information contained in the reports we have received during the convention. We will now take up the report of the special committee appointed on the Rules of Interchange as to prices.

This report was presented by Mr. Potter and accepted, and the list of prices embodied in it was ordered to be incorporated in the Rules of Interchange.

On motion of Mr. Adams, the Rules of Interchange as revised were adopted as a whole.

The President: Next is the report of the Committee on Subjects for next year.

The Committee on Subjects submitted the following report:

The Committee on Subjects for the next year would recommend as subjects, in addition to those already authorized by vote of the convention, the following:

1. Brake Beams—as recommended by the Committee on Brake Beams for 1893.
2. Recommendations for Standard Location, and Arrangement of Safety Chains for Freight Cars, and recommended practice for attachment of same.
3. Progress in Heating Methods for Passenger Equipment.
4. Progress in Ventilation for Passenger Equipment.
5. Wheel and Flange Gauges.
6. Progress in Advanced Methods for Lighting Passenger Trains.
7. What is being done, and what should be done in maintaining Air-Brake and Hand-Brake Apparatus on Freight Equipment?
8. Hand Brakes and Their Maintenance on Passenger Equipment.
9. Compressed Air and Its Application and Uses in Connection with Car Shops.
10. Lubrication of Cars and Prevention of Hot Boxes.

Respectfully submitted,
A. M. WAITT,
R. E. MARSHALL,
S. A. CRONE.

THE PRESIDENT: This report will be referred to the Executive Committee when the committee is appointed.

The next will be the report on the Location of Dummy Coupling.

The committee on this subject submitted the following report:

To the President and Members of the Master Car-Builders' Association:

Your committee appointed to report on the advisability of submitting to letter ballot the change proposed in the standard location of dummy couplings for air brake hose, is of the opinion that the location suggested, as shown on blue print submitted is preferable to the present standard location. *It is, therefore, recommended that the question be submitted to letter ballot,* all details of construction being omitted from the drawing, and only the dimensions necessary to determine the location shown, as on the standard drawing which would be affected by the change.

Respectfully submitted,
R. E. MARSHALL,
A. M. WAITT,
S. HIGGINS.

MR. LENTZ: I move that the report be received and the recommendations adopted.

The motion was carried.

THE PRESIDENT: We will now have a report from the Committee on Correspondence and Resolutions.

Many courtesies have been extended to the members of the Master Car-Builders' Association and their families and friends during their meeting at Lakewood.

Your Committee on Resolutions and Correspondence present the following resotions of thanks:

To the Erie Railway lines, for free transportation and excursions tendered the members and their families.

To Messrs. A. E. Mitchell and S. Higgins, heads of the motive power department, for their kindly interest and personal efforts to the success of the convention and comfort of the members.

To the N. Y. C. & H. R. R. R., the W. N. Y. & P., the Chautauqua Lake R'y, the Chautauqua Steamship Company, for transportation and excursions extended.

To Sibley & Miller, for courtesies tendered.

To the Chautauqua Assembly, for extending the convention the privileges of their grounds.

To the *Railway Age* and *Northwestern Railroader*, for their enterprise in conducting a daily publication with reports of the proceedings.

To the proprietor of the New Kent House, Mr. Brady, its manager, Mr. Fox, and their able assistants, for their politeness and kindly attention to the comforts of all.

WILLIAM McWOOD,
E. M. ROBERTS,
Committee.

THE PRESIDENT: Mr. Rhodes, I believe, has something to say.

MR. RHODES: Mr. Chairman, I have a resolution to offer:

Resolved, That the present size of the M. C.-B. Annual Report, namely, 6 by 9 inches be adopted as standard and be submitted to letter ballot.

That refers to this report (referring to report for 1892). There is nothing now to prevent the Secretary or anybody else from changing the size, and it has been thought by several members that that ought to be incorporated among our standards.

MR. ADAMS: I will second Mr. Rhodes' motion.

MR. RHODES: Another point comes up in connection with that, and that is that if the trade manufacturers in their trade books would also adopt this standard of 6 by 9 inches or for larger pamphlets some other dimensions, it would be a great convenience to the railroad men in preserving and keeping some of the circulars, which are very important. As it is now they are of all sizes. They do not fit the drawers and cabinets and in many cases they get lost. When we want to see some of the trade circulars we do not find them. What we would propose would be to submit this dimension to letter ballot, with respect to our own report; and for the rest, as it would require some little consultation with the manufacturers, I think that a committee should be appointed to report on the subject as soon as they can. I do not know just whether we want to wait until next year for that or not. It would seem to me they might get together and prepare their report. It cannot be acted upon until next year. My motion is simply to refer 6 by 9 inches as the standard size of our report to letter ballot.

MR. SANDERSON : I would like to have that motion acted on first and then I would like to say something further on the catalogue question.

The motion was carried.

MR. SANDERSON : I am much obliged to Mr. Rhodes for bringing this question up. Some little time ago I wrote a little squib to one of the papers on the subject, and went a little further than Mr. Rhodes in the matter. Only one gentleman took notice of it, and he wrote and said that we ought to go further and that the railroad companies should adopt a standard size of specifications so that they could be bound and filed in proper shape, and that the collection which a man would make during his life of railroad specifications could then be kept in good shape and would be really valuable. Now they are all sizes and all shapes. But referring back to the catalogue business, for a good many years catalogues have accumulated in my office. They had to be stuffed in the cupboard and drawers. They would not fit any place I could keep them in. They got all covered with dust. When I wanted a special plan I could not find it, and the only way was to spend hours in hunting through the dusty, dirty things to find it. I think it would be wise for the manufacturers, if they are disposed to agree on a size, to confer with the manufacturers of file cases and try and choose a size that will suit the file cases that are made, or that can be made conveniently. Then when we get these catalogues we can file them and put our hands right on the information that we want. I feel that those manufacturers who would take action in that line and would furnish their catalogues and pamphlets in those shapes would probably get the bulk of the business, because their catalogues would be most easily found and most readily referred to on requisitions. That would be a direct inducement for them to do it. I would therefore like to make a motion that a committee be appointed to confer with the organization of Trade Supply Men with a view to adopting some one or two standard sizes of trade catalogues to be used for all railroad supply purposes.

The motion was seconded.

Mr. Marshall: I would like to amend that by moving that the same committee look into the question of having a standard size for railroad specifications, as Mr. Sanderson suggests. Will you accept that amendment?

Mr. Sanderson: Yes.

The motion was carried.

The President: The next business in order is the election of officers.

Mr. Adams: Mr. President, as the nominations have been presented I would move you that the Secretary be instructed to cast the ballot.

The motion was carried.

Mr. Cloud: The ballot is cast and the following officers are elected:

President, E. W. Grieves.
First Vice-President, J. S. Lentz.
Second Vice-President, S. A. Crone.
Third Vice-President, T. A. Bissell.
Treasurer, G. W. Demarest.
Executive Committee for two years—R. C. Blackall, J. C. Barber and J. M. Wallis.

The President: I will appoint Mr. Rhodes, Mr. Sanderson and Mr. W. H. Lewis as a committee to look after the standard size of catalogues and the standard size and form of specifications. The mode of selecting a place of meeting has always been left to the joint committee of the two Associations. But it is always usual to have an expression of opinion of the members at the meeting as to where the members desire to meet next year, as a guide to the joint committee. We will hear any propositions now from the members as to the place of meeting.

Mr. Adams: I move that we put down Saratoga as the place of meeting.

Mr. Hennessey: I suggest Old Point Comfort.

Mr. McGee: Denver.

Alexandria Bay, Montreal, Kansas City, St. Paul and St. Louis were also named.

The convention then adjourned.

REPORT OF ARBITRATION COMMITTEE

ON

CASES ARBITRATED SINCE THE LAST CONVENTION, AND PROPOSED AMENDMENTS TO THE RULES OF INTERCHANGE.

The Arbitration Committee submits herewith its report for the year since the last convention, embodying the cases arbitrated during the year, all of which have been distributed to the members from time to time, as rendered.

As required by the Rules of Interchange, the committee asked for suggestions from the members as to desirable changes in the Rules of Interchange, and in reply thereto it received numerous communications from the railway clubs as well as from the members of the Association, which were considered at a meeting held in Chicago May 17, and in view of all the facts brought to its attention, and to its experience during the past year, it reports as follows as to desirable changes in the Rules of Interchange.

The committee believes that radical changes in the Rules of Interchange are undesirable without very careful consideration and as full a knowledge as possible of the effect of such changes on the general interchange of cars, which cannot always be foreseen without careful consideration. By this the committee does not mean that we should not make progress by improving the Rules, but that only such changes should be made from time to time as will facilitate the interchange of cars without injustice to all concerned.

RULE 3.

SECTION (*f*). The Western Railway Club proposes to amend this section to read:

"If the flat spots caused by sliding are 2½ inches in length or over. Care should be taken to distinguish this defect from *worn through chill.*"

The committee does not concur in this recommendation, as it would involve similar amendment of several other sections, and it does not believe that sufficient good will result to justify the change.

SECTION (*h*). The Central Railway Club proposes that the 1½ inches mentioned in this section should be changed to 2 inches, but the committee does not concur in this suggestion.

SECTION (*p*). The Central Railway Club proposes that the wheel seat for axles under 50,000 pounds capacity cars should be 4¾ inches, and under cars of 40,000 pounds capacity, 4⅝ inches. The committee does not concur in either suggestion.

SECTION (*t*). Both the Central Railway Club and the Western Railway Club recommend the insertion of the word "handholds" in this section, and the committee concurs in this suggestion.

RULE 5.

The Central Railway Club proposes the use of a partial repair card to cover partial repairs made necessary for the safe running of the car, and to be used for partial repairs of defects noted on the original defect card, the repairs so made to be stricken off the original M. C.-B. defect card, which must be left on the car. In making this proposition the club submits a copy of the card proposed. The committee has carefully considered this matter, but it does not believe it would be expedient to introduce an additional card. To meet the point raised, however, the committee again suggests what it suggested last year, and it now proposes to embody the suggestion in the Rules by adding another paragraph to Rule 5, to read as follows:

"Separate M. C.-B. defect cards must be used to cover defects which are classed as running repairs, such as all air-brake work and work on brake attachments, which it is important to keep in good order."

The Western Railway Club also made similar suggestions in regard to the use of a partial repair card, but it proposes to substitute it for Rule 6. As already stated, the committee does not concur in the use of any partial repair card.

RULE 6.

The New England Railroad Club proposes to strike out the clause "providing such repairs are necessary for the safe running of the car." The committee does not see any sufficient reason for making this change, as it assumes that such repairs would not be made on foreign cars unless they were necessary for the safe running of the car, and believes that the safest course is to leave this clause in the rule.

RULE 8.

Several of the railway clubs recommend that Rule 8 should remain as it now is, and the committee concurs in this suggestion.

RULE 9.

The Central Railway Club proposes the insertion of a new rule to bear number 9, covering what the club calls "Home Defects," to read as follows:

"The following defects on home-bound cars, when they do not give evidence of recent origin, or being caused by derailment, or by unusually rough handling, should be considered as home defects, and the cars shall be passed on to the owners if safe to run, without defect cards for these defects:

"1. Roof boards loose or missing or tin or iron roof loose.
"2. End or side sheathing loose.
"3. End or side finish loose or missing.
"4. Ends or sides bulged, not broken.
"5. Corner plates cracked.
"6. Draft springs broken.
"7. Center plate bolts broken.
"8. Bolster guide bars broken or cracked.
"9. Bolster guide blocks broken.
"10. Truck truss rods broken.
"11. Body truss rods broken when hung up in safe condition to run.
"12. Oil box covers missing or broken.
"13. Spread trucks.
"14. Loose dead blocks.
"15. Cars low on trucks where wheels come in contact with intermediate timbers.

" 16. Side bearings and bolts broken in a manner that does not interfere with the safe handling of car.

" 17. Arch bars broken or cracked.

" 18. Decay timbers.

" 19. Leaky roofs."

The committee does not concur in this suggestion. It would conflict with Rule 3, as it now stands, and the committee believes it would lead to a great deal of misunderstanding in the interchange of cars.

RULE 10.

The committee recommends to add to this rule as it now stands the words "except as already provided for in Rule 8." This recommendation is made because there has been some misunderstanding as to whether labor charges should be made in renewing brake shoes and journal bearings on individual cars.

RULE 12.

The committee recommends that the prices for new, secondhand and scrap wheels should be revised and reduced. (Detailed figures will be submitted to the convention by the committee.)

RULE 16.

The New England Railroad Club and the Central Railway Club propose to modify this rule so as to require that when it is necessary to change an M. C.-B. coupler it must be replaced with one of the same make, or, if another make is used, the uncoupling arrangement shall be made operative. The committee does not concur in the suggestion as made, but recommends to add to the rule as it now stands, another paragraph reading as follows:

" Any company finding a link and pin drawbar in a car originally equipped with a drawbar of the M. C.-B. type and carded for wrong material, may replace the link and pin drawbar with proper M. C.-B. drawbar and bill upon the card to the railroad company carding the car with the wrong drawbar."

RULE 18.

The Central Railway Club proposes to insert in the third paragraph of this rule the words, " or between cross tie-timbers," so that the last sentence of the paragraph would read as follows: " The splicing of two adjacent sills at the same end of the car or between cross tie-timbers will not be allowed."

The committee concurs in this suggestion.

RULE 19.

The Western Railway Club proposes to strike out the last sentence of this rule, and the Southern and Southwestern Club proposes to add to the rule as it now stands, that railroads applying wrong drawbars shall have the option of having them returned, freight collect, or scrap credit allowed. The committee concurs in the suggestion of the Western Railway Club to strike out the last sentence of this rule, and make no further alteration.

RULE 20.

The committee would recommend to add to this rule the words " except as provided in Rule 16 for the replacement of link and pin drawbars with the M. C.-B.

type when they are standard to the car," making it conform with what the committee has recommended in regard to change in Rule 16.

RULE 21.

The Southern and Southwestern Railway Club recommends striking out the word "wheels" from the column headed "Shop Marks on Wheels and Axles." The committee sees no reason for concurring in this suggestion.

RULE 23.

The committee proposes that the figure $50 additional for each car equipped with air brakes should be changed to $40, and that the word "piping" in the next to the last line be omitted.

The managers of some of the special stock car companies have represented to the Arbitration Committee that they do not get a fair settlement value for their cars destroyed, and that inasmuch as they do not have an opportunity to be recompensed for the unfair settlement value as railroad companies have, their cars should be rated along with refrigerator cars in this rule. The committee believes that there is reason in some cases for this claim, and it can only suggest that the matter could be met by the insertion of the words "Special Stock Cars" after refrigerator cars in the last paragraph of this rule.

RULE 26.

The Western Railway Club proposes to modify the charges and credits for materials in this rule so it would read as follows:

MATERIAL.	CHARGE.	CREDIT.
Cast Iron, per pound	$ .01 6-10	⅝ cents.
Malleable Iron, per pound	.03½	½ "
Bolts, Nuts and Forgings, per pound	.04	1 "
Steel Castings, per pound	.06	¾ "
Spring Steel (not Springs), per pound	.05	¾ "
Brass Journal Bearings, per pound	.12	9 "
Phosphor-Bronze Bearings, per pound	.13	9 "
Lumber: Yellow, White and Norway Pine, Poplar, Oak, Hickory and Elm, per foot	.03	....
Labor, per hour	.20	....
1 Box or Stock Car Side Door, applied	5.00	....
1 Box Car Ventilated Side Door, Wooden Frame with Iron Rods	8.00	....
1 Box or Stock Car End Door	3.00	....
Chain, per pound	.05	1
Air-Brake Coupling, applied	2.00	....

The committee concurs in these suggestions, except that it would recommend to make one item reading, "Brass and Bronze Journal Bearings, charge 13 cents, credit 9 cents," instead of making two items, as proposed, with different charges. The committee would also suggest that another item be introduced, reading, "Journal bearings; shell filled with white metal," with proper charges and credits.

The Central Railway Club proposes to add certain items to the table showing the hours of labor which may be charged for in doing various items of work, and the Western Railway Club proposes similar and additional items, as follows:

1 M. C.-B. knuckle	½ hour	10 cents.
Replacing center-plates, 1 or 2 at one end	3 hours	60 "
Replacing center-plate bolts in part, or all at one end	3 "	60 "
Replacing draft-timber bolts complete, at one end of car	3 "	60 "
Replacing dead-wood at one end of car	2 "	40 "

The committee concurs in the suggestion of the Western Railway Club as above given.

The Central Railway Club further recommends that the item for one door or side post should be changed under refrigerator cars from three hours to six hours, and in all other cars from three hours to four hours, with a corresponding change in the charges given. The committee concurs in this suggestion.

RULE 30.

The committee thinks that the first paragraph of Rule 30 is not well worded, and that it should be worded as follows:

" In order to settle disputes arising under the rules, and to facilitate the revision of the rules at the annual conventions of the Association, an Arbitration Committee of five representative members shall be appointed annually by the Executive Committee; three members of this committee to constitute a quorum. The committee shall ask for suggestions of changes, amendments and additions to these rules prior to each annual convention, which it shall consider, and it shall report its recommendations to the succeeding annual convention.

RULE 31.

The Central Railway Club calls attention to the fact that the number of votes prescribed in this rule is in conflict with the number prescribed by the Constitution in other matters when a vote is taken on a representative basis. The committee believes this point is well taken, and that Rule 31 should be changed to read:

" In the revision of these Rules by the Association, each railroad company shall be entitled to one vote for each full one thousand eight-wheel cars owned or in process of purchase in addition to the personal vote of its representative member. Two four-wheel cars shall count as one eight-wheel car. A two-thirds vote shall be necessary for adoption.

JNO. W. CLOUD,
Secretary.

CHICAGO, May 20, 1893.

MINUTES OF MEETING HELD IN CHICAGO, NOVEMBER 15 AND 16, 1892.

Members Present.—F. D. Casanave, Chairman; G. W. Rhodes, M. M. Martin and John Mackenzie.

Mr. J. W. Marden, who could not attend the meeting, subsequently concurred in the following decisions.

Resolved:

FIRST —That no hypothetical case will be considered.

SECOND — That all cases will be decided under the rules in force at the date of the card.

ARBITRATION CASE NO. 124.

BILL FOR JOURNAL BEARING RENEWED.

ATCHISON, TOPEKA & SANTA FÉ RAILROAD COMPANY

versus

ST. LOUIS, ALTON & SPRINGFIELD RAILROAD COMPANY.

The Atchison, Topeka & Santa Fé Railroad Company rendered bill for renewing a journal bearing under St. Louis, Alton & Springfield car No. 511.

The St. L. A. & S. R. R. Co. objects to paying the bill, stating that the car had a full set of new bearings put in just prior to its leaving home, and that if it was necessary to renew the bearings, it was occasioned by box running dry. It states that it is the universal custom for connecting lines not to receive cars which are not in proper order unless they are carded, and if the bearings were damaged by an intervening road the owner should not be held responsible. It further states that it does not render bills when it finds it necessary to put new bearings in foreign cars, as someone is certainly at fault in accepting the car when bearings are not in good order.

The A. T. & S. F. R. R. Co. claims that the old bearing was worn out and not in condition to perform service, and that the renewal was made and bill rendered in accordance with M. C.-B. Rule No. 8.

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 8, Section "(c)" provides that journal bearings worn out shall be chargeable to the company owning the car.

The A. T. & S. F. R. R. Co. claims the bearing was worn out. This is disputed by the St. L. A. & S. R. R. Co., which states that the car was provided with a new set of bearings before leaving its road. It claims that the bearing must have been worn through lack of lubrication.

The committee cannot settle questions of veracity. The road handling this car states that the bearing was worn out, and it is not possible for the committee to dispute the assertion. Neither can the St. L. A. & S. R. R. Co. do so, having no knowledge of the condition of the bearing at the time of its removal.

The committee is therefore of the opinion that the St. L. A. & S. R. R. Co. should pay the bill.

ARBITRATION CASE NO. 125.

WRONG DRAWHEAD.

NEW YORK, LAKE ERIE & WESTERN RAILROAD COMPANY

versus

NORFOLK & WESTERN RAILROAD COMPANY.

The New York, Lake Erie & Western Railroad Company rendered bill against the Norfolk & Western Railroad Company for replacing drawbar on N. Y. L. E. &

W. car No. 6169 upon a defect card issued by the N. & W. R. R. Co., calling for "one (1) wrong drawhead, N. Y. L. E. & W. property"; the words "N. Y. L. E. & W. property" having line drawn through them.

The N. & W. R. R. Co. claims that this card was originally made out reading, "one (1) odd drawhead, N. Y. L. E. & W. property," which meant that the two (2) drawheads on the car were not alike, but that both were of the kinds used by the N. Y. L. E. & W. R. R. Co. and commonly found on their cars. It states that the N. Y. L. E. & W. R. R. Co. advised that the erasure on the defect card was not made on its line, and that the drawhead which it replaced was foreign to the car, and it seems, therefore, to it that the N. & W. had been imposed upon, if not by the N. Y. L. E. & W., by some intervening road which may have damaged the right drawhead and replaced it with another different from the original and not an N. Y. L. E. & W. standard, and made the erasure on the defect card.

The N. Y. L. E. & W. R. R. Co. claims that there is no evidence that the N. & W. inspector knew that the wrong drawhead applied was the N. Y. L. E. & W. property, neither has a statement been made of the kind and class of drawhead applied, by which this claim can be verified. It further states, that the wrong drawhead on the car when received was not the property of the N. Y. L. E. & W., and also that the appearance of the words "N. Y. L. E. & W. property" does not affect the claim, as under Rule No. 15, "work shall conform in detail to the original construction, etc."

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule 15 requires that in repairing foreign cars railroad companies must use material in accordance with that originally used in the construction of the car. Rule 19 provides, also, that failing to do so, the company doing the work shall be liable for the cost of restoring the parts to the original standard.

The N. & W. does not deny that it applied an odd drawbar, but it claims that it was of a type used by the N. Y. L. E. & W. in some of its cars.

This statement is disputed by the owner, who states that when the car was received the drawbar in it was not standard to its road.

Under the rules cited the N. & W. was bound to replace it with another, standard to that car, and having failed to do so, it is clearly responsible for the replacement made by the owner.

The change alleged to have been made by some person upon the defect card does not affect the merits of the case. The card was given for an odd drawbar, that is, one not standard to that car, and the fact that it may have been of a type used by the N. Y. L. E. & W. on some other cars, so long as it was foreign to that particular car, renders the road applying the card liable for the same.

For the reasons stated, the committee is of the opinion that the N. Y. L. E. & W. may charge the N. & W. upon its defect card for the cost of replacing the wrong drawbar with another standard to that particular car.

ARBITRATION CASE NO. 126.

WRONG AXLES AND JOURNAL BOXES.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY COMPANY
versus
UNION PACIFIC SYSTEM.

On August 10, 1891, the Chicago, Rock Island & Pacific Railway Company offered P. R. R. car No. 24,024 to the Pennsylvania Company with four (4) wrong axles and eight (8) wrong brasses; the axles measuring 6 feet 11½ inches long over all. The car was accepted by the Pennsylvania Company and repairs were made by it, with the previous understanding with the C. R. I. & P. R'y Co. that it would reimburse the Pennsylvania Company for renewing the wrong parts, which was done. The C. R. I. & P. R'y Co. then traced the car and found that it was received from the Union Pacific at Council Bluffs, August 2, 1891. Before its acceptance the inspector for the Rock Island and the inspector of the Union Pacific could not agree upon the defects to be carded, and it was left to the arbitrator at that point, who decided that card should be issued against the Union Pacific for wrong oil boxes, arch bars, etc., the car having been previously refused at that point by the C. R. I. & P. R'y Co. on account of these defects and sent to the Omaha shops of the Union Pacific system for repairs May 19, but on account of the accumulation of bad order cars, the work could not be done and the car was forwarded to Council Bluffs transfer on the date mentioned above, when card was issued against the Union Pacific system as mentioned, but nothing was said to the arbitrator about the wrong axles and brasses. The inspector for the Rock Island, however, states that he measured the axles and journals and found that they were of the M. C.-B. standard for 50,000 pounds capacity cars; the car in question being of that capacity.

The Union Pacific traced the car and found that it was not in any accident and that no repairs were made while in its possession. The trace shows the receipt of the car by the Union Pacific system from the Montana Union Railway Company (owned jointly by the Northern Pacific and Union Pacific systems), at Silver Bow, March 28, 1891, and the joint car inspector at that point has no record of the car. He refers the papers to the Montana Union R'y Co., which company replies that the car was damaged in a wreck on its line December 1, 1890, and turned out of its shops at Anaconda, March 26, 1891. The Montana Union R'y Co. states that it placed four (4) pairs of wheels under the car with M. C.-B. axles and eight (8) M. C.-B. journal boxes, and that these repairs were in accordance with M. C.-B. rules, and that the car was carefully examined by the inspector of the Union Pacific at Silver Bow, March 28, and pronounced all right.

DECISION.

From the correspondence submitted it appears that a foreign car was offered by the Union Pacific to the C. R. I. & P. at Council Bluffs transfer. The car had been improperly repaired with a number of odd parts. It was refused by the inspector of the C. R. I. & P., and the joint inspector issued cards against the U. P. for a number of the wrong parts, in accordance with the decision of the joint arbitrator of the roads at that point, who had been called upon to decide the matter between the inspectors of the U. P. and the C. R. I. & P. R'ys.

It appears also that in addition to the wrong parts carded for, wrong axles and bearings were under the car, and that it was accepted by the C. R. I. & P. R'ys inspector without calling the arbitrator's attention to it, thus failing to locate the responsibility on the delivering road.

The C. R. I. & P. claims that the U. P., which made the delivery of the car, is responsible, while the latter company claims that another company, from which it received the car, is responsible.

The Arbitration Committee has repeatedly decided that the Rules of Interchange give each road an opportunity to protect itself when accepting cars in bad order, by requiring defect cards from the roads delivering the cars. Its failure to do so makes it responsible for the actual condition of the cars, and when it attempts to deliver such cars to another company, it is bound to card the defects, if required by the accepting company.

As it does not appear in this case that the C. R. I. & P. availed itself of its privileges under the rules, to require cards for all existing defects from the U. P. before accepting the car, it is the opinion of the committee that any claims made upon that road after delivery are not in accordance with the rules.

ARBITRATION CASE NO. 127.

CARDED CAR WRECKED ON ANOTHER ROAD.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY

versus

THE NEW YORK, CHICAGO & ST. LOUIS RAILROAD COMPANY.

The Cleveland, Cincinnati, Chicago & St. Louis Railway Company rendered bill against the New York, Chicago & St. Louis Railroad Company for repairs to C. H. & D. car 20127 upon a defect card issued by the N. Y. C. & St. L. R. R. Co. calling for one (1) drawbar, one (1) damaged head block and two (2) draft timbers. This car was afterward damaged on the C. C. C. & St. L. R'y as follows: Two (2) draft sills, two (2) draft timbers, one (1) end sill, one (1) drawbar and twelve (12) siding boards broken.

The N. Y. C. & St. L. R. R. Co. objects to the payment of the bill; first, because, under the decisions of the Arbitration Committee of the M. C.-B. Association, cases 30 and 78, the C. C. C. & St. L. R'y Co. cannot collect on the defect card for wrong drawbar; second, because it was not necessary to make the repairs; third, had the car not been in wreck the repairs would not have been made by the C. C. C. & St. L. R'y Co.

The C. C. C. & St. L. R'y Co. claims that the damage the car sustained on its line was the result of the defects for which the car was carded by the N. Y. C. & St. L. R. R. Co., and it was found necessary, when making the repairs for which it was responsible, to also renew the parts for which the N. Y. C. & St. L. R. R. Co. was responsible according to the defect card, and it claims that the bill is proper and in accordance with the decisions of the Arbitration Committee of the M. C.-B. Association, cases 63 and 64. Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

In accordance with Rule No. 6 repairs on defect cards can only be made when such defects endanger the safety of the car. Wrong drawbars can only be removed by an intermediate company on the ground of safety at the time the car is accepted, but not after the car has been accepted and has already been in service on the line of the accepting road.

In the case under consideration the C. C. C. & St. L. R. R. Co. accepted the car in question in a defective condition from the N. Y. C. & St. L. R'y Co., but properly carded. The acceptance and movement of the car by the C. C. C. & St. L. is evidence that the defects did not impair the safety of the car. It is further shown that the parts carded needed no repairs until the car had been wrecked by the C. C. C. & St. L. R. R. Co.

It is safe to assume also that, if it had not been in wreck, the car might have passed to the owner without repairs.

Cases Nos. 63 and 64, cited by the C. C. C. & St. L., are not parallel cases. These decisions would apply if the C. C. C. & St. L. had found it necessary to renew the draft timbers and head blocks at any point on its road on the ground of safety. It might at the same time have renewed the drawbar, because a separate defect card for it had not been furnished by the N. Y. C. & St. L. R. R., and the removal of the single card containing the defective parts would have resulted in making the C. C. C. & St. L. liable to the owner for the wrong drawbar.

The repairs in this case were evidently due to the wreck and not to the weakness of the parts carded. It is, therefore, clear in the opinion of the committee that under the rules no charge can properly be made against the N. Y. C. & St. L. R. R.

NOTE.—*Mr. Mackenzie being interested in this case, was not a party to the decision.*

ARBITRATION CASE NO. 128.

CARD ISSUED FOR FLAT WHEELS WITH SPOTS SHORTER THAN THE LIMIT.

SOUTHERN PACIFIC COMPANY

versus

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY.

The Southern Pacific Company rendered bill against the Chicago, Rock Island & Pacific Railway Company for replacing wheels under S. P. car No. 8700 upon a defect card issued by the Joint Car Inspector at Colorado Springs, stating that this car was delivered by the C. R. I. & P. R'y Co. to the Colorado Midland with one pair of flat wheels, 2½-inch and 1½-inch flat spots; one wheel with 2-inch flat spots.

The C. R. I. & P. R'y Co. objects to the payment of the bill, claiming that the inspector should not have carded for the wheels, as the flat spots on them did not exceed the limit prescribed by the M. C.-B. Rules, and that any railroad company would accept the car with flat spots on wheels which did not exceed 2½ inches in length, without card.

The S. P. Co. claims that the charge is a proper one under Rule No. 8, which states that the car owner shall not be responsible for wheels removed if the cause of removal is flat spots. Also, that under Rule No. 3 cars may be refused on account of certain defects, but cannot be refused for slid flat wheels unless the flat spots are over 2½ inches, and although the car cannot be refused, it not being unsafe to run, it does not think that a road offering a car could refuse to furnish a card for such defects, the same as for any other damage to the car which did not render it unsafe to run. It also thinks that it was not the intention when the limit for flat spots was placed on wheels for which a car must not be refused by connections, to place the responsibility on some other road. Also, that the car cannot be considered as having been returned in as good condition as when delivered, as required by Rule No. 2.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

Rule No. 4 provides that a car with defects which do not render it unsafe to run nor unsafe to trainmen, must be accepted, but in such cases the company to which the car is offered may require that a defect card shall be given by the road offering the car. This rule would apply to the case under consideration if the matter of responsibility for wheels was not explicitly made clear in Rule No. 9, which prescribes in what cases wheels shall be charged to the car owner, and in what cases to the company damaging the wheels. The provisions of Rule No. 9 make it perfectly clear to this committee that Rule No. 4 was never intended to apply to wheels, inasmuch as there would immediately arise a conflict between it, in that event, and the provisions of Rule No. 9.

Paragraph (a) of the exceptions to Rule No. 9, applicable to wheels, provides that wheels shall not be charged to the company owning the car if the cause of removal is "flat sliding," and paragraph (f) of Rule No. 3 describes "flat sliding" to consist of flat spots caused by sliding, if such spots exceed 2½ inches in length.

General practice supports this view of the case, as it is not customary to require cards for wheels. The committee is therefore of the opinion that the Joint Car Inspector was not justified in issuing the card in question, under the Rules of Interchange, and the bill based upon this card should be withdrawn.

NOTE.—*The Arbitration Committee will recommend that Rule No. 4 be made more explicit when the rules are revised in June, 1893, and that it be made to except wheels from the operation of the provisions of this rule.*

ARBITRATION CASE NO. 129.

BILLS FOR WHEELS RECENTLY APPLIED BY SAME COMPANY.

SOUTHERN PACIFIC COMPANY

versus

AMERICAN REFRIGERATOR TRANSIT COMPANY.

The Southern Pacific Company rendered bill against the American Refrigerator Transit Company for replacing wheels under A. R. T. Co. car No. 5456, December 5, 1891. The wheels removed were of the Central Pacific make, which is a part of the Southern Pacific; defect, cracked plate.

The American Refrigerator Transit Company states that when the car was built it had four pair of trial wheels, all of different make, placed under the car, and it returned the papers to the S. P. Co. for information as to whether the wheels removed and billed were applied by that company and for record of original wheels removed.

The S. P. Co. states, after further investigation, that it finds the original wheels were removed on its line November 26, 1891, on account of cracked plates, and that through carelessness of one of its employés no report was made of the removal of these wheels and no bill rendered, but bill has now been rendered for the same.

The A. R. T. Co. objects to the payment of the second bill, claiming that it is not just; that the S. P. Co. renewed its own wheels under the car after being in service only about ten days, and that if the bill were accepted it would be paying for two pair of new wheels and only getting the service of one pair.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule 9 provides, section (j) that wheels failing for "cracked plates" are chargeable to the car owner.

There should be no room for dispute as to the right of the S. P. to charge the A. R. T. Co. for wheels removed from the car in question for this cause assigned by the former company. That course is in accordance with the rule.

The A. R. T. Co. does not base its refusal to acknowledge the bill upon a misunderstanding of the rule, but upon the records of the transaction which show that the wheels under that car when turned over to the S. P. were of a certain make, and that while the car was in service on that road the wheels were removed on account of cracked plates. Also that the wheels used in replacement by the S. P. were of its own make, and that these failed on the same road after about ten days' service, and were again replaced with others, charge being made against the car owner for each replacement. The A. R. T. Co. argues that the wheels were manufactured by the road which applied them, and as they gave such short service, it seems evident that they were of inferior quality, and should not be charged against the car owner.

The committee cannot, of course, consider the question of the quality of the wheels. The Rules of Interchange do not prescribe any standard. It must not be presumed, however, that a railroad company would use, either under its own or any other equipment, wheels which were not considered safe. The fact that one or more new wheels failed after a short service could not be advanced as proof of the general poor character of the wheels used or manufactured by any maker.

It must, therefore, be assumed that the wheels used by the S. P. in replacement of others that failed, were as good as the S. P. would use under its own cars. Having done so, its action was within the scope of the spirit of the rules, and its further action in billing for the same was also, in the opinion of the committee, justifiable and within the spirit of the rules, and the American Refrigerator Transit Company should pay both bills.

ARBITRATION CASE NO. 130.

BILLS ON DEFECT CARDS FOR ITEMS WHICH OWNERS ARE RESPONSIBLE FOR.

THE CHICAGO & EASTERN ILLINOIS RAILROAD COMPANY
versus
THE EVANSVILLE & TERRE HAUTE RAILROAD COMPANY.

The Chicago & Eastern Illinois Railroad Company rendered bills against the Peoria, Decatur & Evansville Railway, which is a division of the Evansville & Terre Haute Railroad Company, for repairs to C. & E. I. cars upon defect cards issued by the latter company as follows:

Defect card issued October 11, 1891, calling for one coil of spring broken in truck of C. & E. I. car No. 7869.

February 7, 1892, calling for one truck bolster broken, C. & E. I. car No. 334.

November 13, 1891, defect card calling for one section of truck bolster cracked, old defect, C. & E. I. car No. 226.

March 22, 1892, defect card calling for one damaged side sill and one brake beam rod gone, C. & E. I. car No. 4850.

May 12, 1892, defect card calling for one cracked bolster, old defect, C. & E. I. car No. 38.

The E. & T. H. R. R. Co. objects to the charges on account of broken bolsters and coil spring on the ground that, in accordance with M. C.-B. Rule No. 8, which governs cases of this kind, the expense of making such renewals should be borne by car owner, stating also that the cars were not derailed on its line which would cause these defects.

In case of C. & E. I. car No. 4850, it objects to paying for brake heads and shoes, which are included in bill and not called for on the card, stating that if the same were missing the receiving road would undoubtedly have demanded a card covering the missing parts.

The C. & E. I. R. R. Co. claims that the bill for renewing the bolsters and spring were made out in accordance with the M. C.-B. Rules, the defect card being a guarantee to the company owning the car or making the repairs called for on the card, that such repairs will be paid for by the company carding for the defects. In case of repairs to car 4850 it states that while the brake heads and shoes were not separately mentioned on the card, yet they are attachments of the brake beam, and necessarily missing with it, and claims that this charge is also in accordance with M. C.-B. Rules.

Both parties agree to refer the case to the Arbitration Committee for a decision.

DECISION.

Rule No. 8 provides that "car owners shall be chargeable with the repairs of their own cars when such repairs are necessitated by section (d): Truck or body bolsters or spring planks, or truck springs broken, provided that the car was not derailed or wrecked."

In view of the plain requirements of the rule cited, there should be no room for dispute. It is clear that the car owner is responsible. The fact that defect cards were given, either through the ignorance of the inspector delivering the car, or that of the inspector who required them before accepting the car, does not change the responsibility.

From the correspondence submitted it is shown that the inspector of the E. & T. H. R. R. gave the cards because the inspector of the O. & M. required them, the latter probably being ignorant of the rules. He should have been cognizant of the fact that he could accept the cars without cards for such defects as are covered in the rules cited without incurring responsibility, because that road could make repairs when necessary and charge the cost to the owning road. The fact, however, that he was ignorant, and that the offering road in consequence and to expedite the movement of the cars gave such cards, should not be taken advantage of by the owner to render bills upon such cards, for parts for which it is solely responsible under the rules.

The opinion of the committee is that the charges for all parts covered in section (d) of rule 8 should be canceled.

In regard to charge for C. & E. I. car No. 4850, the card calls for "one damaged side sill, one brake beam and rod gone." The charge for the damaged sill is proper, also, for the brake beam complete, that is, including all parts attached to it and which are not otherwise attached to the truck or car, or could not remain in place on the truck or car after the loss of the brake beam.

ARBITRATION CASE NO. 131.

BILL FOR DRAWBAR WORN OUT.

THE CENTRAL RAILROAD OF NEW JERSEY
versus
MANHATTAN OIL COMPANY.

The Central Railroad of New Jersey rendered bill against the Manhattan Oil Company for replacing drawbar on M. O. Co. car No. 1613 on account of it being worn out and unsafe. It claims that the bill was made in accordance with Rule No. 10; that drawbars are just as liable to give out under fair usage, if not more so, than any other portion of the car, and therefore does not see why bill is not a proper one against the individual car owner.

The M. O. Co. disclaims the bill, stating that if the drawbar was not in perfect condition when the car was received by the C. R. R. of N. J. from connecting line, that it was in error in accepting the car without demanding a defect card, and inasmuch as it was received from another road, the road in whose possession the car is, is responsible for the condition of the drawbar, and had the car been handled properly it would not have been possible to break the drawbar.

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 10 provides that in case of cars belonging to private parties and corporations, the repairs and renewals of all parts which fail under fair usage or on account of ordinary wear and tear or bad or inferior design, may be made by railroad companies, and shall be paid for by the owners.

In the case in dispute, a drawbar in M. O. Co's car broke while in service on the C. R. R. of N. J. This road states that the breakage was not due to improper handling, but to gradual wear and tear which must eventually result in breakage. The owner claims that no drawbar will break except through rough usage. The committee cannot agree with this statement. It is evident that wear and tear is the result of service. If the period of service be sufficient, the parts will be weakened to the extent of actual breakage.

The committee is not in a position to dispute the statement of the C. R. R. of N. J. that breakage was not due to improper handling, and it must, in the absence of evidence to the contrary, accept this statement. The owner might have examined the broken part, but it does not appear that this was done, and there remains, therefore, only the statement of the railroad company, and the committee is obliged to decide the case upon the evidence furnished.

Bills are rendered and paid without question by railroad companies, upon the statement presented by the one to the other that wheels, axles, brake shoes and heads, truck bolsters, springs, etc., failed for certain causes for which the rules require the car owner to assume responsibility.

The claim made by the M. O. Co. that the C. R. R. of N. J. should, before accepting the car, have required a defect card, is inconsistent with the spirit of the rules (provided always that the drawbar in question had, as is claimed, not been damaged). If, however, its usefulness had been impaired on the line of another road, through rough handling resulting in cracks, it would have been the duty of the accepting road to require a defect card. There is no evidence to show that such was the case. The drawbar, it is asserted, was weakened by long service, but yet safe. The C. R. R. of N. J. accepted the car, thus expediting its movement. It was aware that in case of final breakage in fair usage, it could, under the rules, replace it and render bill against the owner, and therefore needed no other protection. It could not require a defect card from the delivering road because, according to its statement of the condition of the drawbar, the owner only was responsible.

From the evidence furnished, the committee is of the opinion that the bill rendered by the C. R. R. of N. J. is proper and in accordance with the rules.

ARBITRATION CASE NO. 132.

WRONG DRAWBARS CARDED. CHARGE FOR ATTACHMENTS IN REPLACING.

OHIO & MISSISSIPPI RAILWAY COMPANY

versus

TOLEDO & OHIO CENTRAL RAILWAY COMPANY.

The Ohio & Mississippi Railway Company rendered bill against the Toledo & Ohio Central Railway Company for repairs to O. & M. car No 7343 upon a defect card issued by the T. & O. C. R'y Co. calling for "two wrong drawheads; one damaged draft timber."

The T. & O. C. R'y Co. objects to the payment of the bill, stating that the amount of material used, namely, 409 pounds castings and the 197 pounds forgings, covers the drawbar attachments, which the card does not authorize, and claims that these attachments were all right when the car was carded for the two wrong drawheads.

The O. & M. R'y Co. claims that its standard drawheads require the use of yokes and followers, and bill was only rendered for what material was used and credit given for the drawheads and attachments removed. It further claims that wrong drawbars must include the yokes and followers, and that it certainly would not have used others had it not been necessary, and does not know how the T. & O. C. could tell that the yokes and followers were all right when car was carded.

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 6 provides that "Any company finding a car with defect card may make the repairs noted by the card," etc.

In the case under consideration the defect card calls for "Two wrong drawheads and one damaged draft timber."

The bill rendered upon the authority of that card contains charges for material said to have been used for yokes and followers, which the committee does not understand to be covered by the defect card.

The committee has decided in former cases that railroad companies when accepting cars in bad order must protect themselves by efficient and thorough inspection and demand cards to cover all existing defects. The liability of the road carding is limited to the actual defects enumerated upon the card.

In the opinion of the committee, therefore, the bill rendered is not in accordance with the rules, in so far as charges for labor and material used in replacing parts other than those given upon the defect card are concerned.

ARBITRATION CASE NO. 133.

CARD FOR "TWO COILS TRUCK SPRINGS GONE." BILL FOR REPLACING.

LAKE ERIE & WESTERN RAILROAD COMPANY

versus

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC RAILWAY COMPANY.

The Lake Erie & Western Railroad Company rendered bill against the Cincinnati, New Orleans & Texas Pacific Railway Company for replacing two (2) coils of truck springs upon a defect card issued by the latter company, calling for two (2) coils T spring gone. Five cents per pound is charged for the two coils of springs, and the C. N. O. & T. P. R'y Co. objects to this price per pound, stating that these coils of springs should be billed under the head of manufactured articles, as single coil springs are obtainable in the market. The L. E. & W. R. R. Co. claims that M. C.-B. Rule No. 26 states that manufactured articles not included in the list of prices in said rule are to be charged at current market prices, and that the list referred to includes spring steel at 5 cents per pound. It further states that the car in question has truck springs consisting of four (4) single coils, and that it used two single coils to repair the complete bolster spring, and that these single coils are not purchased at so much per piece, but are bought by the pound.

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 26 provides that manufactured articles not included in the list of items and prices, shall be charged at manufacturer's prices, without freight charges. The point in dispute is whether one or more of the coils in a nest of springs shall be charged at the price fixed in the list for spring steel, Rule No. 26, or at manufacturer's prices for complete springs. The intent of the rule is that the charge of 5 cents per pound for steel is proper only when made for material used in repairs of parts made of similar material. If the part charged for, however, is a spring bought already completed from a manufacturer of that article, it must be charged at manufacturer's prices, whether that be more or less than the cost per pound given for steel in the rules.

At an early stage of the controversy between the disputants, the L. E. & W. stated, in answer to the request of the C. N. O. & T. P. to change the bill to correspond to the manufacturer's prices, instead of per pound, that single coil springs did not, under the rules, come under the head of manufactured articles, and that the price charged was in accordance with M. C.-B. Rules. The committee does not agree with that statement.

At a later stage the same road, when stating its case for the committee, said that it did not buy these springs by the piece, but by the pound, as it buys castings, brasses, etc. If that be true (and the committee is not in a position to assert the contrary) and the price paid is 5 cents per pound, the committee is of the opinion that the charge is proper. It would make no difference to the road against which the charge is made whether it be by the pound or piece, provided it represents the manufacturer's price, as the rules contemplate.

ARBITRATION CASE NO. 134.

BRAKE SHOES RENEWED WITH CONGDON SHOES. RATES FOR.

SAVANNAH, FLORIDA & WESTERN RAILWAY COMPANY

versus

NEWPORT NEWS & MISSISSIPPI VALLEY COMPANY.

The Savannah, Florida & Western Railway Company rendered bill in accordance with Rule No. 8, section (b), against the Newport News & Mississippi Valley Company for renewing three brake shoes under N. N. & M. V. car No. 7019, weight of shoes 20½ pounds each, or 61½ pounds, charging $2 for same. As the bill did not give price per pound for castings it was returned, and the S. F. & W. R'y Co. states that it used three Congdon brake shoes and charged them at manufacturer's price in accordance with Rule No. 26.

The N. N. & M. V. Co. refuses to accept the bill on the ground that the Congdon brake shoes are foreign to the car, and that in accordance with Rule No. 15 it is not a proper charge.

The S. F. & W. R'y Co. interprets Rule No. 26 to mean that if no castings are on hand of the same type as those on the car it can apply whatever kind it may have on hand.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

The Rules of Interchange, Nos. 15, 19 and 20, certainly convey very distinctly the idea that in repairing foreign cars, the character of the work must conform in detail and design to the construction of the car. If that is not done, Rule No. 20 places the responsibility for the changes necessary to restore the car to the original standard upon the company which used the wrong parts or material.

The rules cited make no exception of any parts except such as belong to the M. C.-B. standards, which may be substituted for others, provided they do not mar or impair the efficiency of the car.

In view of the plain requirements of the rules cited, the committee must conclude that the brake shoes applied by the S. F. & W. R'y Co. should have conformed in design to the type removed from the N. N. & M. V. Co's car. It follows, therefore, also, that had it done so it could not have charged more than the rules prescribe for cast iron, of which material the original shoes were made.

If in this case it was to the interest of the S. F. & W. R'y to move the car promptly, and it could not wait until proper material was procured, it assumed responsibility for the use of the wrong kind, but in view of the fact that the owner was also benefited by the prompt movement of the car, it is certain that no objection would have been made to the use of wrong material, provided the charge for the same had been in harmony with the rules.

It is therefore the opinion of the committee, that the objections raised by the N. N. & M. V. Co. to the bill in question, are in accord with the rules, and that bill should be rendered based upon the rates given in the rules for iron castings.

ARBITRATION CASE NO. 135.

BILL FOR HINSON KNUCKLE, INCLUDING FREIGHT CHARGES.

SOUTH FLORIDA RAILROAD COMPANY
versus
CINCINNATI, NEW ORLEANS & TEXAS PACIFIC RAILWAY COMPANY.

The South Florida Railroad Company rendered bill against the Cincinnati, New Orleans & Texas Pacific Railway Company for replacing one (1) Hinson knuckle on S. I. C. L. car No. 55385 upon a defect card issued by the latter company, calling for one Hinson knuckle cracked.

The C. N. O. & T. P. R'y Co. objects to the charge of $4.56 for the knuckle, stating that in accordance with the decisions of the Arbitration Committee of the M. C.-B. Association, cases 81 and 82, manufacturers' prices only must be charged, without any additional freight charges.

The S. F. R. R. Co. claims that the charge just covers what the knuckle cost it, and as the M. C.-B. Rules do not forbid the charging of cost price, the bill should be accepted. It states further, that in the two cases referred to, the interested roads were centrally located and that the freight would not be very much, and also that the knuckles in both cases were of the Janney type, weighing 30 pounds, while the Hinson weighs 50 pounds. It still further states, that it would not be just if it bought knuckles in Chicago, to pay the freight on them to South Florida and then sell them for what they cost in Chicago.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 26 provides that "Manufactured articles not included in the above list, shall be charged at current-market prices *without freight charges.*"

In the opinion of the committee, the objection raised by the C. N. O. & T. P. R'y Co. is in accordance with the rule cited, and that bill should be rendered without freight charges..

ARBITRATION CASE NO. 136.

CAR DESTROYED. DIFFERENT AGES FOR BODIES AND TRUCKS.

HOUSTON & TEXAS CENTRAL RAILWAY COMPANY

versus

SOUTHERN PACIFIC COMPANY.

On December 18, 1891, Houston & Texas Central car No. 188 was totally destroyed on the Southern Pacific. The Houston & Texas Central Railway Company rendered bill for the same, depreciating the body of car five (5) years one (1) month and twenty-five (25) days, and the trucks five (5) months and twenty-one (21) days.

The Southern Pacific Company objects to this manner of depreciating, stating that the body and trucks should be depreciated from the time the car was put into service, or from the time it was entirely rebuilt.

The H. & T. C. R'y Co. claims that it is scrapping all of its old trucks and replacing the same with new trucks of larger capacity, and that in the case in question the depreciation has been allowed on the body from the date it was actually built and on the trucks from the date they were actually built.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

At the last convention of the M. C.-B. Association a motion was offered and carried. after prolonged discussion, as follows: "It is the sense of this Association that the values of bodies and trucks destroyed shall be determined by the respective ages of bodies and trucks, in accordance with the rules."

As the rules themselves are not explicit on this point the Arbitration Committee follows the recent decision of the Association in convention, and it is therefore of the opinion that the age of the trucks may be determined separately, from the time they were built, regardless of the age of the car body, and bill should be paid accordingly.

ARBITRATION CASE NO. 137.

AXLE BROKEN. CHARGE FOR OTHER DAMAGE RESULTING.

NORTHERN PACIFIC RAILROAD COMPANY

versus

PENNSYLVANIA RAILROAD COMPANY.

The Northern Pacific Railroad Company rendered bill, amount $44.12, against the Pennsylvania Railroad Company for repairs to P. R. R. car No. 6517 on account of an axle broken four (4) inches from center under the car. Bill includes charge for replacing wheels.

The P. R. R. Co. objects to the bill on the ground that the failure of axle is a defect for which the owner is not responsible after car has been accepted by a foreign road. It further states that the car owner would be responsible for broken flange of wheel if breakage was caused by "seams," worn through chill, or worn flange, as provided in Rule No. 9, paragraph (g), and that in this case, if the flange was broken on account of these defects, bill would be accepted for replacement of the wheels and axles, provided credit were allowed for one scrap and one secondhand wheel and a secondhand axle.

The N. P. R. R. Co. states that the question whether the wheel was defective or not does not have any bearing in the matter at all; the damage was occasioned by the breakage of the axle, and bill rendered in accordance with Rule No. 9, paragraph (b).

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 9 provides that axles shall be charged to the company owning the car if the cause of removal is due to axles bent or broken, or with collars worn off under fair usage. The rule leaves no room to question the right of the N. P. R. R. Co. to charge the P. R. R. for the broken axle, which the former claims failed under fair usage. The objection raised by the P. R. R. to the claim, namely, that the owner is not responsible for the failure of the axle when the occurrence takes place after the acceptance of the car by a foreign road, implying thereby that the road is liable because of insufficient inspection, is not in harmony with the rules. That argument applies only to failures of parts which are not specifically excepted from the operation of the rules, and axles are so excepted.

In this case reasonable inspection is required only on the ground of safety, and not for the purpose of avoiding liability, as responsibility for failure of the axle is eliminated by the operation of the rule cited.

The committee is, therefore, of the opinion that the axle is properly chargeable to the P. R. R. Co.

The bill rendered by the N. P. R. R. Co., however, is not confined to the axle; it contains charges for wheels and other parts of the car and truck, the failure of which is said to be consequent upon that of the axle. The decision rendered as to the axle, therefore, does not cover all the points in dispute. It remains for the committee to express an opinion upon the propriety of charging the car owner with consequential damage. The principle involved is of great importance to railroads in general, and the committee will base its decision upon a broad interpretation of the rules, and accordance with certain principles applicable generally to all railroad companies.

The solution of the question depends upon the propriety, or the converse, of placing the responsibility of consequential damage upon the owner of the car, or upon the road which operated it at the time of the occurrence. If the damage had resulted from the failure of a part or parts, which under the rules are chargeable to the road accepting a car because of defective inspection, no charge against the car owner for either the broken parts or others which may have been damaged in consequence, would be admitted. Does the fact that the broken part, which under the rules was one chargeable to the car owner, extend the responsibility against him, also, for other parts broken in consequence? If so, the first question that suggests itself is, where is the limit to consequential damage to be drawn? Supposing that in the case under consideration the damage, instead of being confined to one particular car, had extended to the entire train; in other words, causing a wreck, involving loss of life, and resulting in the payment of damages on account of such loss of life or property; would the claim against the car owner be admitted if made upon the basis of the entire loss? It seems perfectly safe to say that it would neither be presented nor admitted. If, as seems very reasonable, the liability of the car owner cannot be extended so far, it still remains necessary to define where it shall end, and the answer should leave no room in future for further misunderstanding.

In the opinion of the committee the best and safest limit to establish is that which confines the responsibility solely to the part which caused the damage, which in this case was the axle.

In further support of its position against the impropriety of charging consequential damage to the car owner, the committee deems it proper to advance another argument.

The principle that every business involves certain risks, will not be disputed. Any resultant losses are anticipated by a prudent business manager, and provision for meeting them is made when the question of determining the value of the product or service rendered is considered. This principle applies as well to railroad companies. These losses are just as likely to arise from failures of its own as from foreign cars, because it is undoubtedly true that every railroad company when manufacturing equipment or purchasing it from other manufacturers, takes every possible precaution to guard against inferior or bad material or workmanship. In spite of that, failures, due to hidden defects, or deterioration of material from constant service, frequently occur, and it would not be fair to say that the liability of such failures is greater in foreign cars than in those owned by any company.

The reason that any railroad company uses foreign cars must be that it is to its advantage to do so, either by reason of insufficient equipment of its own or otherwise. If it used its own cars the liabilities from breakage might not be less, and the losses, therefore, would be assumed as one of the ordinary risks of that particular business. It is difficult to reason that the same risks should not be assumed in case foreign cars are substituted for its own cars in the furtherance of the road's business. The practice of interchanging cars is general, and therefore, the risks arising from their operation are mutual.

The assumption of consequential damages by the company operating the cars is also in perfect harmony with the Rules of Interchange, which are designed to facilitate—in fact, make possible—the interchange. The principle underlying the rules is that a foreign car is to all purposes and intents the property of the company operating it. It is responsible for its safe return, and must give it the same care that it gives to its own equipment. In case of damage it must be made good in all except a few cases excepted in the rules for which the car owner is responsible. But in the opinion of the committee it would be a perversion of the rules to extend the responsibility beyond the parts so excepted. To do so would be to establish a dangerous precedent which, to our minds, is not for the best interests of the roads operating under the rules, nor consistent with equity or sound business principles.

The opinion of the committee is, therefore, that the bill rendered by the N. P. against the P. R. R. should be confined to charges for axle and wheel work, as per rule No. 12.

NOTE.—*Mr. Casanave being interested in this case, was not a party to the decision.*

ARBITRATION CASE NO. 138.

AXLE BROKEN. CHARGE FOR OTHER DAMAGE RESULTING.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY

versus

PITTSBURGH & WESTERN RAILROAD COMPANY.

The Cleveland, Cincinnati, Chicago & St. Louis Railway Company rendered bill, amount $46.61, against the Pittsburgh & Western Railroad Company for repairs to P. & W. car No. 3031 damaged on account of broken axle, which gave out under fair usage.

The P. & W. R. R. Co. objects to the bill, stating that under the M. C.-B. Rules the C. C. C. & St. L. R'y Co. can only bill for replacing the axle as per Rule No. 9, paragraph (b), and not for consequential damages.

The C. C. C. & St. L. R'y Co. claims that the cause of the broken axle was inherent defects in the metal; that the car was 50,000 pounds capacity and that the axle was but four (4) inches in diameter in the center, whereas, the rules specify that axles for that capacity cars should be 4⅛ inches, and the fracture showed that about one-third of the break was an old defect. Also, as the P. & W. R. R. Co. acknowledges responsibility for the broken axle, it concludes that that road was equally responsible for the other damage done on account of the broken axle.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

The arguments in Arbitration Case No. 137 apply equally to that now under consideration, and the opinion of the committee is that the C. C. C. & St. L. can only claim compensation for axle and wheel work, in accordance with Rule No. 12.

The committee has noted what is said by the C. C. C. & St. L. about the dimensions of the axle, which it is claimed were below the limit fixed in the rules. The latter road was not obliged to accept the car unless it was safe. Failure to properly inspect places the responsibility for the axle upon the road making improper inspection.

ARBITRATION CASE NO. 139.

BILL ON CARD FOR "WROUGHT DRAWHEAD CRACKED IN FACE." CHARGE FOR RENEWAL OF DRAWBAR COMPLETE.

SOUTHERN PACIFIC COMPANY (PACIFIC SYSTEM)

versus

HOUSTON & TEXAS CENTRAL RAILWAY COMPANY.

The Southern Pacific Company rendered bill against the Houston & Texas Central Railway Company for replacing a drawbar on G. H. & S. A. car No. 8653 (which car is operated by the S. P. Co.), upon a defect card issued by the Joint Car Inspector at Fort Worth, calling for one (1) wrought drawhead cracked in face.

The bill calls for 183 pounds casting, 43 pounds drawbar spring strap and 10 pounds bolts.

The H. & T. C. R'y Co. objects to the payment of the bill for replacing the drawbar, claiming that it should only be charged for renewing the cracked face, which is all that is covered by the card, and which would amount to about 10 pounds wrought iron, and that it could not be held responsible for any damage which might have occurred to the drawbar after the car left its road, even if occasioned by the defective part carded, as Rule No. 6 states that any company finding a car with defect card may make repairs noted by the card, if they are necessary, and render bill for the same against the company attaching the card.

The S. P. Co. claims, that the drawbar was badly damaged, that the face of the drawbar was gone and the drawbar spread open and twisted; that it was necessary to renew it for the safe running of the car. It further states, that the fact remains that the drawbar was sufficiently damaged to necessitate an inspector's defect card before the car would be accepted by the receiving road, and claims that the further damage to the drawhead was the result of the original fracture carded, and it is for just such cases as this that defect cards were put in use, that is, the receiving road accepts the car with defects, which at the time did not render it unsafe to run, but demands defect cards to protect it from further damage that may arise from these defects.

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 6 provides that "Any company finding a car with defect card attached may make the repairs noted by the card, provided such repairs are necessary for the safe running of the car, etc."

The S. P. Co. accepted from the H. & T. C. R'y Co., at Fort Worth, a car with a defect card furnished by the Joint Inspector at the point named, calling for "one wrought drawhead cracked." This defect card carried with it the authority to any road to repair the part carded, when necessary.

The rules do not require the repairs upon a defect card to be made at the time of its issue, "unless necessary to the safety of the car." It is given in acknowledgment of the responsibility of the road carding, for the damage mentioned on the card, said damage to be made good at its expense, when in the judgment of the accepting road the safety of the car requires it.

In so far as the repairs to the drawbar in this case were concerned, the S. P. Co. might have made them at any time and to the extent necessary to bring that part to its original state of efficiency, even though an entirely new part had to be made; but having accepted the car with part so carded, and kept it in service until other parts were affected or broken through the damaged part carded as is claimed, it is not justified in charging for repairs to such other parts. The charge must be confined to the part originally carded. This conclusion must appear reasonable when it is considered that the accepting road had its authority at the time of acceptance to replace or repair the damaged part, if its continuance in service endangered the safety of the other parts. Not having done so, it is liable for all further consequential damage.

The committee cannot undertake to decide what the extent of the repairs shall be, or the cost. The road responsible must be content to abide by the honesty and judgment of the road making the repairs. It implied its willingness to do so when it gave its defect card, as otherwise it would have made good the damage before the delivery of car was effected.

It may be added that the H. & T. C. contends that the S. P. should not charge for the drawbar in question, because it is of a type which is now being confined to the scrap heap on account of its inefficiency.

This statement is denied, but were it true it would have no bearing on the decision, because the H. & T. C. R'y disproves its statement by the fact that it accepted the car with that drawbar, and, were it true, it would be guilty of careless inspection and therefore responsible for the results.

It is the opinion of the committee, therefore, that the S. P. Co. can only charge for the cost of repairs to the parts carded.

ARBITRATION CASE NO. 140.

TRUCK DESTROYED AND NEW TRUCK PURCHASED FROM CAR OWNER. DEPRECIATION CLAIMED.

LOUISVILLE & NASHVILLE RAILROAD COMPANY

versus

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC RAILWAY COMPANY.

On January 18, 1892, the New Orleans & North-Eastern Railroad Company (part of the Cincinnati, New Orleans & Texas Pacific Railway Company) destroyed one truck belonging to Louisville & Nashville car No. 16072. Car was built in May, 1884, and is of 40,000 pounds capacity. The N. O. & N.-E. ordered a truck from the car owner to replace the one destroyed, and bill was rendered for the new truck furnished, namely, $100.

The N. O. & N.-E. objects to this charge, stating that bill should be rendered for the truck destroyed, depreciated from the time the car went into service in accordance with M. C.-B. Rule No. 23, as the truck received and put under the car is still the property of the car owner.

The L. & N. R. R. Co. argues that it is optional for a limited time for the company destroying the car to settle for it with the owner or else rebuild or repair it. In case it elects to pay for the car destroyed, there is a depreciation on both body and trucks. If, however, it rebuilds it and calls upon the car owner for material, it would be furnished at M. C.-B. prices, no matter whether it was only in part or as a whole, and that it could no more take advantage of the depreciation of the entire body than it could for any part of it that it asked to furnish.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

In accordance with Rule No. 23, a railroad company which destroys a car body and trucks may, if it so elects, rebuild the same, or settle for it in accordance with the rules. If it elects to rebuild the car it may order from the car owner any material which it cannot purchase in open market, and Rule No. 25 provides that the latter shall furnish it and deliver it free of freight charges over its own lines.

The rule cited prescribes that the material ordered for that purpose shall be furnished at prices fixed by the rules, which are presumed to cover as nearly as possible its actual value. It is evident that if it was ordered from other parties or manufacturers, that the road ordering would not pay less than its actual market value. It does not seem reasonable, therefore, to expect that the car owner should furnish it at less cost.

In the case in dispute, and for reasons best known to itself, the C. N. O. & T. P. chose to buy a complete truck from the owner, instead of manufacturing it itself. Had it ordered the parts necessary from the owner, or from other parties, it would have paid their actual value, and would have claimed no depreciation. It does not seem reasonable that, because it bought both the material and labor in a complete truck, it should expect a rebate. Had it settled for the body and trucks instead of rebuilding them, a claim for depreciation under the rules would have been proper.

It may be well to dispose of the argument used by the C. N. O. & T. P., namely, that because the truck remained the property of the L. & N. R. R. Co., the depreciation should be allowed. The committee does not think so, because if the C. N. O. & T. P. had rebuilt the car and trucks with entirely new material, it could not have made a claim for betterments, although it gave back a new truck for another partly worn.

For the reasons stated the committee is of the opinion that the bill as rendered by the L. & N. R. R. Co. is correct.

ARBITRATION CASE NO. 141,

RATE FOR BODY OF ORE CAR DESTROYED.

THE MINNEAPOLIS, ST. PAUL & SAULT SAINTE MARIE RAILWAY COMPANY

versus

THE DULUTH, SOUTH SHORE & ATLANTIC RAILROAD COMPANY.

On December 26, 1891, the body of Minneapolis, St. Paul & Sault Sainte Marie Railway Company ore car No. A-533 was destroyed on the line of the Duluth, South Shore & Atlantic Railroad Company. Bill was rendered for the same with the initial value of the car body at $252. This is objected to by the D. S. S. & A. R. R. Co. on the ground that the car was of 40,000 pounds capacity, drop bottom, and that settlement should be made in accordance with M. C.-B. Rule No. 23, namely, value new, $220.

The M. St. P. & S. Ste. M. R'y Co. claims that this was an ore car of modern pattern, similar to the hopper bottom coal car shown in Fig. 20 in "Car Builders' Dictionary," and that the bill was made in accordance with M. C.-B. Rule No. 23, "For all cars designed for special purposes." It agrees, however, to decrease the initial value of the car to $240, which is the settlement price for hopper bottom cars in M. C.-B. Rule No. 23.

The D. S. S. & A. R. R. Co. states that the car is a drop bottom car, and attaches sketches showing the outline of the car, and also its idea of a drop bottom car.

DECISION.

Since the owner states that the car in question is of 40,000 pounds capacity and is a hopper bottom car similar to that shown in Fig. 20 of the M. C.-B. Dictionary, the committee is of the opinion that the bill for settlement of the car body should be based on the item in Rule 23 which reads: "Gondola car, eight-wheel, hopper bottom, 20 tons or over, $240."

ARBITRATION CASE NO. 142.

DEFECT WHICH OWNER IS RESPONSIBLE FOR. CARD ISSUED.

THE CHICAGO & EASTERN ILLINOIS RAILROAD COMPANY

versus

THE OHIO VALLEY RAILROAD COMPANY.

The Chicago & Eastern Illinois Railroad Company rendered bill against the Ohio Valley Railroad Company for replacing one broken truck bolster on C. & E. I. car No. 600 in May, 1892, upon a defect card issued by the Ohio Valley Railroad Company dated September 15, 1891.

The O. V. R. R. Co. objects to the payment of the bill on the ground that the renewal of the part mentioned is covered in M. C.-B. Rule No. 8, and is a defect for which the owner of the car is responsible; stating also that the car was not injured while in its possession.

The C. & E. I. R. R. Co. states that an M. C.-B. defect card is a definite acknowledgment of responsibility on the part of the company which issued it, and that when repairs are made the company making the repairs should be paid by the company which placed the card upon the car.

Both parties agree to refer the case to the Arbitration Committee for a decision.

DECISION.

Rule No. 8 provides that car owners shall be chargeable with the repairs of their own cars when such repairs are necessitated by (a) truck or body bolster, or spring planks or truck springs broken, provided that the car was not derailed or wrecked. The above clause is certainly very explicit, and should leave no room for dispute as to the responsibility in this case.

It has not been shown by the C. & E. I. R. R. that the truck bolster in question was damaged by derailment or wreck. The fact that the removal of the bolster was effected eight months after the issue of the card proves conclusively that its failure was due to ordinary wear and tear. A failure of that character is, beyond doubt, chargeable to the car owner.

The defect card in this case was certainly given through ignorance of the rules on the part of the joint inspector. It was not needed to expedite the movement of the car, because the defect, being chargeable to the owner, any railroad company could accept and handle the car without incurring responsibility, as in the event of renewal becoming necessary to insure the safe movement of the car, the cost of same was chargeable to the car owner.

In view of the plain facts in the case, the committee is of the opinion that Rule No. 8 does not warrant the rendering of a bill in this case, even when a defect card has been given through ignorance of the inspector.

Case No. 29, cited by the C. & E. I. R. R. in support of its position, was decided under the rules in force at that time, and the rules did not then make car owners responsible for failures of truck bolsters. Such, however, is the case under the rules in force at the present time.

ARBITRATION CASE NO. 143.

TRUCK SPRING WITH ONE COIL "GONE." BILL FOR ON CARD.

THE MINNEAPOLIS, ST. PAUL & SAULT SAINTE MARIE RAILWAY COMPANY

versus

THE CANADA ATLANTIC RAILWAY COMPANY.

The Minneapolis, Saint Paul & Sault Sainte Marie Railway Company rendered bill against the Canada Atlantic Railroad Company for replacing one coil of truck spring gone under M. St. P. & S. Ste. M. R'y Co. car No. 5526, upon a C. A. defect card calling for "One coil of truck spring gone."

The C. A. R'y Co. objects to the payment of the bill, stating that it is not responsible for these repairs, as Rule No. 8 provides that car owners shall be charged for such repairs. Also, that the card was merely given to expedite the movement of the car.

The M. St. P. & S. Ste. M. R'y Co. does not interpret Rule 8 as applying to this case, as the card distinctly states that the spring is gone, and that as the C. A. R'y Co. furnished a defect card, the bill should be accepted.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 8 provides that broken truck springs are chargeable to the car owner.

From correspondence submitted, it appears that the C. A. R'y Co. carded the car in question for "one coil of truck spring gone"—not broken. It must be evident that if the C. A. R'y Co. had given this car the inspection and care which under the Rules of Interchange it is bound to give foreign cars, the loss of the spring might have been avoided. For that reason, and from the fact that there is no evidence to show that the spring was broken, it is the opinion of the committee that the bill rendered by the M. St. P. & S. Ste. M. R'y Co. is proper, and in accordance with the rules.

ARBITRATION CASE NO. 144.

BILLS FOR WHEELS WITH CRACKED PLATES AND FOR WHEELS WORN FLAT.

SOUTHERN PACIFIC COMPANY (PACIFIC SYSTEM)

versus

THE UNION PACIFIC RAILWAY COMPANY.

The Southern Pacific Railway Company rendered bills against the Union Pacific Railway Company for replacing wheels under the latter company's cars.

The U. P. R'y Co. objects to the charges for replacing wheels on account of cracked plates, cracks varying from fourteen to sixteen inches long, and for wheels worn flat three inches on the same axle, claiming that in the former case the cracking was occasioned by the wheels being overheated going down some incline, and not using the cars fairly in the matter of air brakes, and in the latter that both the wheels being flat on the same axle is evidence that the flat spots were caused by sliding.

The S. P. Co. claims that the charges were made in accordance with the M. C.-B. Rules, which distinctly specify that such defects for which these wheels were removed are chargeable to the car owner. Also, that the wheels were not unfairly treated, and that the assertions of the U. P. R'y Co. cannot be borne out by facts.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 9 provides that wheels removed on account of "cracked plates" or "worn through chill" shall be charged to the company owning the car.

In the case under consideration the bill rendered by the S. P. is for wheels which it states failed for just such causes.

The U. P. assumes that the failure was due to improper treatment of car (excessive air pressure and sliding), but there is no evidence presented by that road to prove the assertions. On the other hand, the S. P. Co. states that the failures were for causes shown on its bill.

The committee is not in a position to dispute this statement, and in the absence of proof to the contrary, it is of the opinion that the bill as rendered is in accordance with the Rules of Interchange.

ARBITRATION CASE NO. 145.

BILL ON CARD CLAIMED TO BE A FORGERY.

THE CHICAGO & EASTERN ILLINOIS RAILROAD COMPANY

versus

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC RAILWAY COMPANY.

The Chicago & Eastern Illinois Railroad Company rendered bill against the Cincinnati, New Orleans & Texas Pacific Railway Company for repairs to C. & E. I. cars upon defect cards issued by the latter company as follows:

March 25, 1892, C. & E. I. car No. 146, one truck spring gone and three feet of siding damaged and card signed "Detoy."

May 21, 1892, C. & E. I. car No. 3868, one draft timber damaged, one draft sill split and one wrong drawbar.

The C. N. O. & T. P. R'y Co. disputes the bill for repairs to car 146, stating that that car was not on its line March 25, 1892, and that it has no inspector named Detoy at Chattanooga, and claims it is a forgery. It also claims that in checking up the stub for car 3868, the item "one wrong drawbar" has been inserted by an unauthorized person, as it was not on the card when originally issued.

The C. & E. I. R. R. Co. states that while it is unable to say that car 146 was on the line of the C. N. O. & T. P. R'y March 25, and that that line has an inspector by the name of Detoy, yet that cuts no figure, as the car was received in good faith on the strength of the card in question; also, that it is the duty of railroad companies to see that their cards do not fall into the hands of any unauthorized person.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

The C. N. O. & T. P. gives as its reason for disputing the bill rendered on account of car No. 146, that its records do not show that the car in question was on its lines during the month of March, 1892. It states further that it never had in its employ an inspector named Detoy. To this the C. & E. I. R. R. Co. retorts that it cannot say whether its car was on the line of the C. N. O. & T. P. R'y at that time; neither is it willing to consider the identity of the inspectors, nor admit the possibility that the card was forgery. That the latter was the case cannot be doubted from the statement of the C. N. O. & T. P., uncontradicted by the C. & E. I. R. R. Co. that car No. 146 was not on its lines at that time. It is certainly not unreasonable to expect that the C. & E. I. R. R. should show from its records the location of car No. 146 at the time the card was issued. Having stated that it cannot do so the committee must accept the positive evidence offered by the C. N. O. & T. P., and conclude that the latter cannot be held responsible for a card evidently forged by some unknown person on another line.

The point raised by the C. & E. I. R. R., that it is the business of the C. N. O. & T. P. to see that its cards do not get into the hands of unauthorized or dishonest persons, is not reasonable. The more logical course would be to locate the car on the lines of the C. N. O. & T. P. If that were done, the case would assume an entirely different aspect. As presented, however, the committee cannot sustain the claim of the C. & E. I. as to car No. 146.

As to car No. 3868, the C. N. O. & T. P. objects to the charge of wrong drawbar, which item, it is claimed, was not inserted by their inspector.

It appears beyond doubt to the committee that the insertion "one wrong drawbar" is in a different handwriting from that of the previous items.

The committee has already ruled (see case No. 33) that the giver of a defect card is responsible only for defects enumerated upon it, when it appears clear from the writing on the card, that the entries were made at one time and in the handwriting of the same person. In view of the fact that this does not appear to be the case with the wrong drawbar, the committee is of the opinion that that item should be stricken from the bill.

ARBITRATION CASE NO. 146.

BILL RENDERED BY AN INTERMEDIATE COMPANY UPON A DEFECT CARD.

THE DELAWARE & HUDSON CANAL COMPANY

versus

THE DELAWARE, LACKAWANNA & WESTERN RAILROAD COMPANY.

The Delaware & Hudson Canal Company rendered bill against the Delaware, Lackawanna & Western Railroad Company for repairs to P. R. R. car No. 22516, upon a D. L. & W. defect card calling for one defective head timber, and for repairs to W. C. Co. car No. 762, upon a D. L. & W. defect card calling for two defective head timbers and one drawsill.

The D. L. & W. R. R. Co. objects to the payment of the bill, claiming that an intermediate company has no authority to repair foreign cars upon defect cards, unless repairs are necessary for the safety of the car, and that the acceptance of the cars is proof that that accepting company considered them safe. It further states that a company granting a defect card simply binds itself to take the car back in the condition stated on the card, and that the card is no protection against rough handling or accidents, and claims that the repairs in question were made necessary while the cars were in service on the D. & H. C. Co.

The D. & H. C. Co. claims that the defects for which these cars were carded developed greater while in transit on its line, and it was obliged to make the repairs called for, for the safe running of the cars.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

The position taken by the D. L. & W. Co. is, first, "That each company must determine at its accepting point whether or not a foreign car is safe to haul over its own line, for once accepted it takes all risks as to accidents or rough handling, whereby the car is in any respect damaged, and it is bound to return the car in as good general condition as when received."

Rule No. 4 provides that "a car with defects which do not render it unsafe to run or unsafe to trainmen, must be accepted, but defect card may be required, etc."

Rule No. 6 provides that repairs may be made upon a defect card when necessary for the safe running of the car. The logical interpretation of Rule No. 6 must be that a company can make repairs upon a defect card at any time after acceptance of a car, if necessary. Were it not so, defective cars would not be accepted until repairs were made and the car put in such a shape by the delivering company as to make liability for the defective parts on the accepting road impossible. It would, therefore, follow that no defect cards would be used, and their use is certainly contemplated by the rules. Their purpose is to secure acceptance of foreign cars, and to pass them to their owners, and to convey to them evidence of the responsibility for any damage they may have sustained while in the service of any company. They are authority for repairs, which it is intended shall be made by the owner, but if necessary on the ground of safety while the car is on another line en route to the home road, the defect card is authority to that line to make such repairs as may be called for on that card. Such repairs may be made at any time, and are properly chargeable to the road which furnished the card, if final breakage is the result of a gradual extension of the original fracture, occurring through continued service and under fair conditions of handling. They would not be so chargeable, however, if final failure was shown to be due to wreck.

In conclusion, it may be well to cover another point, which is referred to in the argument presented by the D. L. & W. R. R. Co., namely: "That the company accepting a defective car with defect card takes all risks as to accident," etc.

This claim is rather indefinite, but we presume it refers to responsibility for damage to parts other than those carded that may occur through the final failure of carded parts, and in consequence thereof.

If that were the point in dispute, the opinion of the committee would be that a road having accepted a car with defects, thereby implying that it was safe to run and after the acceptance the failure of parts carded caused that of others also, the accepting road could not claim compensation for repairs to other than the parts carded, because it had an opportunity to prevent the damage by making necessary repairs upon authority of the card before their condition became dangerous to the safety of the car.

The objection of the D. L. & W. R. R. Co., however, is not based upon a charge of that nature, but instead to a bill rendered for parts actually carded by it. It is, therefore, the opinion of the committee that the bill rendered by the D. & H. C. Co. for repairs made upon defect cards issued by the D. L. & W. R. R. Co., which it is claimed were necessary to the safety of the car, is in accordance with the rules.

ARBITRATION CASE NO. 147.

RATES IN REVISED RULES. DATE IN EFFECT.

SWIFT & COMPANY

versus

THE CHICAGO & ERIE RAILROAD COMPANY.

Swift & Company rendered bill against the Chicago & Erie Railroad Company for replacing a malleable iron drawbar on S. R. L. car No. 1233 upon a defect card issued by the C. & E. R. R. Co., August 18, 1892, in which a charge of 5 cents per pound is made for malleable iron.

The C. & E. R. R. Co. objects to this price, stating that, in accordance with the revised rules effective September 1, 1892, the charge should be 4 cents per pound, and believes that the revised price includes repairs of all cars after that date, even if defect cards were issued previous to that time.

Swift & Co. claims that the charge is correct, as the defect card was issued prior to the revision of the rules in effect September 1, 1892.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

The Arbitration Committee has already ruled (see cases Nos. 8, 11 and 101) that settlements for repairs upon defect cards must be based upon the rules in effect at the time the defect card was furnished. As the card is dated August 18, 1892, the Committee is of the opinion that the bill rendered by Swift & Co. is correct.

ARBITRATION CASE NO. 148.

BILL FOR RENEWING WHEELS WITH BROKEN RIMS UNDER PASSENGER EQUIPMENT CARS.

THE UNION PACIFIC RAILWAY COMPANY

versus

THE SOUTHERN PACIFIC RAILWAY COMPANY.

The Union Pacific Railway Company rendered bill against the Southern Pacific Railway Company for a number of wheels that failed on account of broken rims.

These wheels were under S. P. baggage and tourist cars which, at the time of breakage, were in service on the U. P. R. R.

The S. P. refuses to pay the bill, on the ground that such breakage must be caused by defective frogs, or by excessive rigidity of the roadbed, on account of frost;

that its wheels are of a high grade of manufacture, both as regards material and workmanship, and equal to any manufactured by any wheel maker.

The U. P. in noting objections answers that the charge was made because the wheels were made by the S. P. Co., owners of the cars in question; that they were at the time of failure nearly new, being manufactured in 1890 and 1891 and removed in the latter part of 1891 and 1892. It alleges further that an examination of the wheels after breakage shows plainly that it was caused by very poor material used in these wheels; that the wheels were set short on the axle, resulting in causing the wheels to run to the outside of the tread; that as there are no indications that the damage was caused by bad joints in the track, the failure may be attributed to fair usage, and therefore is, under Rule No. 9, Section (h), chargeable to the owner.

The S. P., after further correspondence, is unwilling to acknowledge responsibility, and both parties agree to refer the dispute to the Arbitration Committee for a decision.

DECISION.

It will be noticed that this case is one involving passenger equipment, and must, therefore, be decided in accordance with the rules governing the interchange of passenger equipment cars, by which both parties agree to be governed.

The point in dispute is: " Shall the car owner be held responsible for wheels failing on account of broken rims? "

Rule 1 of the special code provides that " Each company shall give to foreign cars while on its line the same care and attention that it gives to its own cars, except in case of cars on which work is done *under special agreement*, existing between the company owning the cars and the road operating the same."

It does not appear from the correspondence submitted that any special agreement exists between the companies named, in regard to the point in dispute. Unless, therefore, other rules definitely provide that wheels failing for the causes named are properly chargeable to the owner, the road which removed them cannot make such a charge.

This will appear still clearer from Rule 2, which provides that " Cars must be delivered in good running order and returned in as good general condition as when received."

It cannot be claimed that this rule had been complied with if the cars were returned with damaged wheels.

There is nothing in Rules 3 or 4 that can be construed as authority to charge the owning road with wheels broken in service, as in this case. Rule 3 authorizes the accepting road to make such alterations and repairs as may be necessary to the safe movement of cars over its line, and must immediately notify the delivering road of the alterations and repairs required, etc., and receive authority to bill for same. This rule clearly contemplates that the accepting road shall make an inspection at the time of acceptance, and make such repairs as may be necessary before the movement of the car on its line. Acceptance without any requirements at that time implies satisfactory condition of the car, and consequent responsibility on the part of the accepting road for failures while on its line.

The condition of the wheels was evidently satisfactory at the time of acceptance. Rule 4 prescribes that wheels failing on account of shelled out, with treads defective on account of circular pieces shelling out, etc., are chargeable to the owner, but for no other defect.

The wheels forming the subject of this dispute have been shown to have failed on account of broken rims, an entirely different defect from that given in Section (a), Rule 4. It is, therefore, clear that no claim against the owner can be based on that rule, which is the only one applicable to the case in dispute.

It is claimed further by the U. P. R'y Co. that the wheels were not properly mounted. If so, it failed to apply the proper remedy as per Rule 2, and is responsible for the results of its own insufficient or improper inspection.

Another claim in support of the bill is, that the breakage of wheels after such a short service is evidence of the poor character of the material in such wheels. The committee cannot agree that such a claim is just; it must presume that no railroad company would use bad wheels under its equipment. It is also safe to say that the failure of one or more wheels should not and cannot be construed as indicative of generally bad foundry practice.

If a railroad has good reasons to believe that another company uses inferior and dangerous wheels, it is not obliged to accept cars equipped with such wheels. If it does so it is liable for the results.

The committee is, therefore, of the opinion that the bill rendered by the U. P. R'y Co. is not in accordance with the rules.

ARBITRATION CASE NO. 149.

CAR DESTROYED. EXTRA CHARGE MADE FOR JANNEY COUPLERS.

THE SAVANNAH, FLORIDA & WESTERN RAILWAY COMPANY

versus

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY.

The Cleveland, Cincinnati, Chicago & St. Louis Railway Company destroyed a car belonging to the Savannah, Florida & Western Railway Company, which was equipped with Janney couplers.

The S. F. & W. R'y Co. rendered bill for this car including an extra charge of $32 for Janney couplers. This charge is objected to by the C. C. C. & St. L. R'y, claiming that there is nothing in the rules that would justify such a charge, and that the couplers are not a special attachment.

The S. F. & W. R'y Co. states that while there is nothing in the M. C.-B. rules providing for charges of this character, yet it would not be fair for it to lose the value of these couplers after having had to pay for them.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 23 does not provide that any extra charge for automatic couplers shall be made against the road destroying a car so equipped.

In the opinion of the committee the extra charge made on that ground by the S. F. & W. R'y Co. is not proper.

ARBITRATION CASE NO. 150.

SPRING PLANK. CAR OWNER CHARGED FOR RENEWAL. WRONG MATERIAL USED.

THE SAVANNAH, FLORIDA & WESTERN RAILWAY COMPANY

versus

THE MISSOURI PACIFIC SYSTEM.

The Savannah, Florida & Western Railway Company rendered bill against the Missouri Pacific System for replacing one defective spring plank under M. P. car No. 5094, in accordance with M. C.-B. Rule No. 8, using pine wood.

The M. P. System objects to the payment of the bill, claiming that oak is standard for this part under their cars, and insists that the S. F. & W. R'y Co. issue a card covering improper repairs in accordance with Rules Nos. 19 and 20.

The S. F. & W. R'y Co. received the car from one of its connections with the defective spring plank, and its inspector concluded that the car was not safe to run, and made the repairs in accordance with Rule No. 8. It claims that the spring plank removed was of pine instead of oak, as claimed by the M. P. people to be their standard. It further states it should be reimbursed for making these repairs, as it does not think it is fair for them to stand the loss when probably some other road put in the pine spring plank contrary to the rules.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

In accordance with Rule No. 8, the S. F. & W. R'y Co. billed against the M. P. for the cost of renewing a spring plank under a car of the latter company, the failure of which is chargeable to the car owner.

The road which did the work claims that the spring plank removed from the car was of pine and that it replaced it with another of the same material.

Rule No. 15 provides that foreign cars must be repaired with material in accordance with that originally used in the construction of the car.

If a company chooses to repair foreign cars, and it is in doubt as to the proper kind of material to use, it must ascertain from the owner what material should be used, and failure to comply with Rule 15 renders it liable.

The opinion of the committee is that the bill rendered by the S. F. & W. R'y Co. is not in accordance with the rule cited, and should be canceled, because it did not use the proper material. The claim of the M. P. that the S. F. & W. R'y Co. should furnish a defect card for the wrong material is not just, because the part which failed is properly chargeable to the car owner.

ARBITRATION CASE NO. 151.

CARD CLAIMED TO BE A FORGERY.

THE CHICAGO, ROCK ISLAND & PACIFIC RAILWAY COMPANY

versus

THE MICHIGAN CENTRAL RAILROAD COMPANY.

The Chicago, Rock Island & Pacific Railway Company rendered bill against the Ohio & Mississippi Railway Company for repairs to C. R. I. & P. car No. 5562 upon a defect card issued by the Joint Car Inspector, at Cincinnati, April 14, 1892, calling for one wrong drawbar and one sill.

The O. & M. R'y Co. objected to the payment of the bill, claiming that the card was a forgery.

The C. R. I. & P. R'y Co. received the car from the M. C. R. R. Co. May 26, without protest, with this card, and upon investigation it is shown that the M. C. R. R. Co. received the car from the C. H. V. & T. R'y, April 24, carrying the defect card in question.

The C. R. I. & P. R'y Co. takes the ground that the M. C. R. R. Co. is responsible for the defects, as that line does not deny that the car had the defects for which it carried the forged card when delivered to the C. R. I. & P. R'y Co.

The M. C. R. R. Co. disclaims any responsibility, stating that if it had been liable for any defects on the car the C. R. I. & P. R'y Co. would have demanded a defect card upon delivery.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

The subject of the dispute is a claim of the C. R. I. & P. R'y that the M. C. assume responsibility for a defect card, alleged to have been issued by the Joint Car Inspector, at Cincinnati, Ohio, for defects existing on a C. R. I. & P. car, against the O. & M., which, upon presentation to the latter road, is pronounced a forgery.

The M. C. shows beyond dispute that it received the car in question from the C. H. V. & T. ten days after the issue of the card, and that the card was at that time attached to the car. It shows that its employés did not tamper with the card. It claims that its execution was such as to preclude the possibility of detecting its fraudulency by reasonable inspection, and the fact that the agent or inspector of the owner of the car when offered to it also failed to discover the alleged irregularity, is sufficient to exonerate the M. C. from responsibility on that ground also.

An inspection of the card in question by the committee also satisfies it that this conclusion is reasonable.

It does not appear from the correspondence submitted that the C. R. I. & P. R'y Co. has made any effort to locate the responsibility beyond the M. C. As the card bears the initials of the O. & M. R. R. the C. R. I. & P. should be able to show that its car was on the line of the O. & M. at the date of issue of the card. The records of the Joint Car Inspector should show to what company the car was delivered, and its condition at time of delivery.

If no card was given on account of the O. & M., it must be evident that the next company handling it was responsible for the application of the forged card, if not for the damage also. If the records of this company again show proper delivery to another, the responsibility must rest with the next accepting company, but not with the one which accepted the car carded with a defect card which, to all appearances, bore reasonable evidences of genuineness.

Unless, therefore, it can be shown that the M. C. R. R. Co. received the car with a card different from that which was upon the car at the time it delivered it to the next line which handled the car, the committee is of the opinion that the M. C. Co. is not responsible.

ARBITRATION CASE No. 152.

BILL ON CARD FOR ONE CAST SPINDLE DRAWBAR AND ONE MALLEABLE SPINDLE DRAWBAR.

THE CLEVELAND, LORAIN & WHEELING RAILROAD COMPANY

versus

THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY COMPANY.

The Cleveland, Lorain & Wheeling Railroad Company rendered bill against the Lake Shore & Michigan Southern Railway Company for replacing two drawbars on C. L. & W. car No. 769 upon an L. S. & M. S. defect card, calling for "One cast spindle drawbar and one malleable spindle drawbar."

The L. S. & M. S. R'y Co. objects to the charge for two drawbars, claiming that the reading of the defect card is equivalent to "mixed drawbars," as referred to in Arbitration Cases Nos. 18 and 62, and claims that the charge should only be made for one drawbar. It further states that if the malleable drawbar was not standard to the car the owning road should have refused to accept the car when the L. S. & M. S. delivered it, unless properly carded. Not having done so it is fair evidence that the malleable drawbar was a satisfactory one, and practically a standard one in every detail.

The C. L. & W. R. R. Co. claims that both drawbars were foreign to the car, and does not agree that Arbitration Cases Nos. 18 and 62 are parallel ones; it claims that the Arbitration Committee decided that the term "mixed drawbars" be not used on defect cards, and also states that the defect card in question plainly states that the defects on the car were "one cast spindle drawbar and one malleable spindle drawbar."

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

The entries upon the card read, "One cast spindle drawbar and one malleable spindle drawbar."

The committee cannot find any ambiguity in the entries. The L. S. & M. S. acknowledges responsibility for two defective parts. The owner states that both drawbars are foreign to the car. The L. S. & M. S. argues that, if it were true, the C. L. & W. should have refused the car until carded; that its card is equivalent to mixed drawbars and was intended to cover only one.

The committee cannot be governed by what it may have intended. It finds a regular defect card, properly filled for two defective parts, and cannot see any error on the part of the owner in accepting the car so carded.

The opinion of the committee is that the bill rendered by the C. L. & W. is proper.

MINUTES OF MEETING HELD IN CHICAGO, FEBRUARY 16 AND 17, 1893.

Members present — F. D. Casanave, chairman; M. M. Martin, G. W. Rhodes, John Mackenzie and J. N. Marden.

ARBITRATION CASE NO. 153.

WRONG MATERIAL. RESPONSIBILITY FOR.

THE NEW YORK, CHICAGO & ST. LOUIS RAILROAD COMPANY

versus

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY CO.

D. L. & W. car No. 32859 was held in the possession of the New York, Chicago & St. Louis Railroad Company at Buffalo, refused by the owner on account of wrong material uncarded.

The N. Y. C. & St. L. R. R. Co. claims that the car was delivered to it by the C. C. C. & St. L. R'y at Cleveland, March 27, with these wrong parts, and that its inspectors were not competent to judge of the wrong material on the car, the same not being discovered until the car was offered to the owner.

The C. C. C. & St. L. R'y received the car from the C. H. & D. R. R. March 12, and delivered it to the Pan Handle; it was returned by that line March 15, taken to Cleveland and offered to the N. Y. C. & St. L. R. R. March 22, and refused for a cut journal and wrong brass; then taken into the C. C. C. & St. L. shops at Cleveland, and these parts renewed, and the car delivered to the N. Y. C. & St. L. R. R. March 27, without question.

The C. C. C. & St. L. R'y Co. claims that the wrong material was not applied by it, and claims that there is nothing to show that there was any wrong material on the car when delivered to the N. Y. C. & St. L. R. R., as it passed the inspection of the N. Y. C. & St. L. R. R. inspectors twice without the same being discovered, and that the car being in the possession of the N. Y. C. & St. L. R. R. Co. it is responsible for the same.

The N. Y. C. & St. L. R. R. Co. further submits a copy of a telegram dated December 21, 1891, from the Master Car-Builder of the Pittsburgh & Western Railway to the Master Car-Builder of the Delaware, Lackawanna & Western Railroad Company, reading as follows:

"I am needing for car No. 32859, 8 oil boxes, box bolts 9-inch centers, 8 wedges, 8 pillow posts and 8 guides. Please send to my address as soon as possible." And accompanying this copy of telegram is a letter from the Master Car-Builder of the P. & W. R. R. to the Superintendent Motive Power of the N. Y. C. & St. L. R. R. Co., which states that the telegram ordered all the material for proper repairs of this car, except such as they could make at their shop, which were made as exact as the duplicate parts in the trucks; they did not consider any of the materials wrong materials, or they would have applied a defect card for them. They have no record of applying any side bearings to this car.

The N. Y. C. & St. L. R. R. Co. claims that the above correspondence shows the responsibility for the wrong material, and that the responsibility for the movement of the car between the two companies is the only point to be decided by the committee, and states that the car passed through a joint inspector's hands from one company to another, and wants to know whether the road offering the car with wrong material is responsible, or the road receiving the car under a joint inspector.

Both parties to the dispute agree to refer the case to the Arbitration Committee for decision.

DECISION.

It appears from the correspondence submitted that the N. Y. C. & St. L. accepted the car in question from the C. C. C. & St. L. The acceptance was unconditional. The question of wrong material was not brought up by the inspector of the former road.

If there was any wrong material, the accepting road had it in its power to require the offering road to card for the same. Having failed to do so the offering road is relieved from responsibility.

In the opinion of the committee, therefore, there is no ground for dispute between the N. Y. C. & St. L. R. R. and the C. C. C. & St. L. R'y. The papers submitted by the N. Y. C. & St. L. R. R. show that the car was repaired by one of the lines which handled the car before it came into the possession of either of the roads parties to the dispute. There is nothing to show, however, that wrong material was used at that time. Had that been the case, and each of the roads which subsequently handled the car failed to discover it, the road which eventually delivered the car to the owner would be responsible.

Every road handling a foreign car is bound to protect its owner by proper and efficient inspection. A failure to do so, either by an inspector employed solely by that road, or jointly with another, shifts the responsibility to the road which accepts the car. His action is binding on either of the roads which jointly employ him.

Mr. Mackenzie being interested in this case, was not a party to this decision.

ARBITRATION CASE NO. 154.

CARS DESTROYED BY FIRE ON PRIVATE SIDING.

THE WABASH RAILROAD COMPANY

versus

LOUISVILLE, EVANSVILLE & ST. LOUIS CONSOLIDATED RAILROAD COMPANY.

On January 4, 1892, five Wabash R. R. Co's cars were destroyed by fire on the siding of the Allison-O'Bear Glass Works, at East St. Louis, Illinois. These cars were delivered to the siding mentioned by the Evansville & Terre Haute R. R., a part of the L. E. & St. L. Cons. R. R. Co., on a switching charge. The Wabash R. R. Co. renders bill against the L. E. & St. L. Cons. R. R. Co. for the value of these cars at the date of destruction, in accordance with M. C.-B. Rule No. 28.

The L. E. & St. L. Cons. R. R. Co. objects to the payment of the bill on the ground that it was not using these cars in regular transportation service, having accepted them from the Wabash R. R. Co. for delivery to the siding on which they were destroyed, on a switching charge, and claims that in that event it is not subject to the responsibilities which attach to a common carrier when transporting loaded or empty cars of another company. It further states that had it loaded the cars on its line and conveyed them on the siding for unloading, it would feel obligated to assume the loss.

One party (the Wabash R. R. Co.) agrees to refer this case to the Arbitration Committee for decision. The L. E. & St. L. Cons. R. R. Co. was asked to present its argument for the consideration of the Arbitration Committee, but having failed to do so after the expiration of three months from the time of this request, the committee decides the matter in accordance with Rule 30.

DECISION.

Rule No. 28 provides that in case of damage or destruction of foreign cars upon private tracks, settlement for same shall be made by the company which delivers the cars upon such private track.

From the correspondence submitted in this case, it is not denied that the L. E. & St. L. Cons. R. R. Co. delivered the cars upon the private track upon which they were destroyed. It is immaterial under what methods of compensation such delivery was made.

In accordance with the rule cited, to which the L. E. & St. L. Cons. R. R. Co. is a subscriber, it is the opinion of the committee that, having delivered the cars upon the private siding, it is responsible to the owner for their destruction.

Mr. Martin being interested in this case, was not a party to this decision.

ARBITRATION CASE NO. 155.

CENTER PLATE BOLTS BROKEN ON INDIVIDUALS' CAR.

THE COLD BLAST TRANSPORTATION COMPANY

versus

THE NEW YORK, CHICAGO & ST. LOUIS RAILROAD COMPANY.

The Cold Blast Transportation Company rendered a bill against the New York, Chicago & St. Louis Railroad Company upon a defect card issued by the latter company calling for "three broken center plate bolts, old," on Cold Blast Transportation car No. 176.

The N. Y. C. & St. L. R. R. Co. objects to the bill on the ground that this is a defect for which the owners are responsible under Rule No. 10, which rule plainly states that the car owner should be charged for all parts that fail under fair usage, and claims that this car received fair usage while in its possession.

The Cold Blast Transportation Co. claims that the bolts were not worn out nor broken on account of faulty construction, and if that had been the case the N. Y. C. & St. L. R. R. Co. would not have been required to furnish a card covering the same. It further claims that the bolts were broken squarely off, and that, in accordance with M. C.-B. Rule No. 6, the bill as rendered is correct.

In further correspondence, the Cold Blast Transportation Co. claims that the Arbitration Committee has in several cases defined this matter very clearly, and refers to Case No. 108. The N. Y. C. & St. L. says that there is nothing in Case No. 108 similar to this, and claims that Rule No. 10 covers the case; that this is a defect for which private car owners are responsible, as it was a failure in fair usage. It also attaches to the papers a copy of a "Defective Car Report," showing that this car upon this trip was received by the N. Y. C. & St. L. R. R. at Knox, Indiana, with two broken center plate bolts upon check and notation, and upon arrival at Buffalo it had "3 broken center plate bolts." The West Shore Road, over which the car was routed, refused it until carded for broken center plate bolts, and as repairs could not be made readily while the car was loaded, the card was issued to prevent detention.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

It will not be denied that, as a result of service, cars wear out and breakages occur in consequence. When caused by rough handling or accidents, the Rules of Interchange require a railroad company to make such repairs as may be necessary through such causes. Rule No. 10 requires car owners to bear the expense of repairs of such parts as fail under fair usage, etc.

This rule is equitable, when it is considered that the owners of individual cars receive from railroads operating the same a compensation for their use of a certain sum per mile run. This compensation undoubtedly covers the interest on the amount invested in the car, depreciation and wear and tear, it being understood that individual companies repair their own cars when worn out.

If, in addition to this compensation, railroads were required to make good the parts which may be worn out, or have failed in fair usage, they would be charged twice for the wear and tear.

There is nothing showing in the correspondence in this case that the center plate bolts were broken in accident or through rough handling. It is shown that when the N. Y. C. & St. L. R. R. Co. accepted the car from another company, it had two center plate bolts broken. It did not request a defect card from that company for the broken bolts because it considered that the owner only was responsible. It, therefore, accepted the car and secured its prompt movement and delivered it to its connection at Buffalo.

The inspector of the West Shore Railroad Company demanded a defect card for the broken bolts, which was given by the N. Y. C. & St. L. R. R. Co., not because it acknowledged responsibility, but for the purpose of again expediting the movement of the car.

The committee is of the opinion that the claim of the N. Y. C. & St. L. R. Co. that the owner is responsible for the parts broken under fair usage is just, and although it gave its card for such parts to expedite the movement of the car, and did not have an opportunity to remove it upon the return of the car on its line, the presence of that card should not be taken advantage of by the owner to bill against that road for the parts which the owner is responsible for under the rule cited. The committee is, therefore, of the opinion that the bill of the Cold Blast Transportation Company should be withdrawn.

Mr. Mackenzie being interested in this case, was not a party to the decision.

ARBITRATION CASE NO. 156.

WRONG DRAWBAR, CREDIT FOR ON INDIVIDUALS' CAR.

NEW YORK CENTRAL & HUDSON RIVER RAILROAD COMPANY

versus

NELSON MORRIS & COMPANY.

Nelson Morris & Co. car No. 6106 reached home with one wrong drawbar for which the New York Central & Hudson River Railroad Co. had carded the car. Nelson Morris & Co. were not willing to credit the first cost for the wrong drawbar when it was removed and their own applied, as per Master Car-Builder's rules, because they claim that it is not just to pay 2 cents per pound for something they do not want, and which has to be scrapped, and which they can only get ½ cent per pound for, and they notify the N. Y. C. & H. R. R. R. Co. that the bar is subject to its disposal.

The N. Y. C. & H. R. R. R. Co. replies that Nelson Morris & Co. should allow them credit of the value new of the wrong drawbar, as all other companies do, under the Rules of Interchange.

Nelson Morris & Co. reply that if they were a railroad company and handled New York Central cars they could make use of these drawbars, but as they are situated they have no use for them. They claim if such rule continues in operation, they will be compelled to let cars run with such drawbars as they come home with, which would soon mix up the drawbars in their cars so much that they would be very unsafe for the railroads to handle. They also claim that many of the railroad companies are taking their drawbars back, as they acknowledge that the rule is not just.

The N. Y. C. & H. R. R. R. Co. makes no further reply to Nelson Morris & Co., but the papers are all referred to the Arbitration Committee, and both parties agree to abide by its decision.

DECISION.

Rule No. 19 provides that, in case a foreign drawbar is removed from a car upon a defect card, a credit shall be allowed of the full value new of the material in the bar, at the rates fixed in Rule No. 26.

The claim of the N. Y. C. & H. R. R. R. Co. is certainly in accordance with the rule cited, and the committee is, therefore, obliged to sustain its claim.

The committee intends to call the attention of the Association to the hardship worked upon owners of individual cars by the operation of the rule. It may be just, in so far as it affects railroad companies, because in the course of interchange the wrong drawbars removed from the cars of one company may again be used in those of another, but individual companies have no such opportunities, having no interchange. The practical result of the enforcement of this rule is either the abandonment of its standards, if it allows wrong drawbars to remain in its cars, or a loss equivalent to the difference in the value of the new and scrap material, if they are removed.

In the opinion of the committee it would be equitable for railroad companies to accept from individual companies in such cases, scrap credits, or to receive the wrong drawbars from them, although not required by the rules.

ARBITRATION CASE NO. 157.

AIR BRAKE COUPLINGS: RATE OF CHARGE.

ALABAMA & VICKSBURG RAILWAY COMPANY

versus

CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY.

On August 10, 1892, the Chicago, Burlington & Quincy Railroad Company rendered bill against the Alabama & Vicksburg Railway Company for $2.55, for one air hose furnished on card of the latter company and attached to C. B. & Q. car 30195 for "one air hose gone."

The A. & V. R. Co. objects to the bill, and claims they can only allow the present market price for air hose, namely, $2.12½, but the C. B. & Q. R. R. Co. objects to this, and says that the air hose cost them at that time at their shop fitted up, $2.55. They find, however, that 10 cents of this figure was for general expenses, which they are willing to deduct, making the bill $2.45, and claims that the bill should be paid at this figure, because that is the cost price.

In further correspondence the A. & V. R. Co. still declines to pay more than $2.12½, which, it argues is the established market price for one air brake hose and coupling, and the C. B. & Q. R. R. Co. argues that there is no established market price for such parts, as they fit up the hose and couplings at their own shops, and they are justified in charging the cost price to them at the time the hose was furnished.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

Rule No. 26 provides that charges for manufactured articles not included in the list shall be at current market prices, without freight charges.

The C. B. & Q. R. R. Co. claims that there is no established market price for such parts, and that it fits up hose and couplings at its own shops, and that it has charged the actual cost of that applied upon the A. & V. R. Co. defect card. If the latter road has evidence that the combination named is sold in open market, it is the opinion of the committee that the C. B. & Q. R. R. Co. cannot charge any more than the prevailing price charged by manufacturers. The fact that the cost at the shops of any railroad company may be greater does not alter the case.

The framers of the rule cited intended to furnish, as nearly as practicable, a uniform basis for charges of that nature. They believed, for obvious reasons, that the manufacturer's cost would best accomplish this end.

Mr. Rhodes being interested in this case, was not a party to this decision.

ARBITRATION CASE NO. 158.

AIR BRAKE COUPLINGS. RATE OF CHARGE.

MOBILE & OHIO RAILROAD COMPANY

versus

CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY.

On July 12, 1892, the Chicago, Burlington & Quincy Railroad Company rendered bill against the Mobile & Ohio Railroad Company for work done on defect cards given by the latter company on C. B. & Q. R. R. cars in which there appears a charge "one air brake hose, $2.55."

The M. & O. R. R. Co. objects to this charge for air brake hose, and states that the market price is $2.22½, and asks that the bill be corrected.

The C. B. & Q. R. R. Co. shows in further correspondence that it buys air brake hose and fits the couplings to them at its own shops, and that the actual cost of doing the work at the time this was furnished was $2.45, to which it added a small percentage to cover general expenses. It is willing, however, to deduct this additional ten cents and correct the bill to $2.45, but is not willing to charge $2.12½. It also submits in support of its position some data showing that this item is not necessarily a manufactured article with any fixed market price, but that it can be put together at any company's shops and charged at actual cost. It admits at the same time that it is now turning out air brake hose and couplings from its shops at a somewhat lower cost even than $2.12½, and that the $2.45 represented the actual cost to it at the time this hose was furnished, and it claims on this account that the price charged in the bill is correct.

The M. & O. R. R. Co. claims that the manufacturer's price for this material on June 30, 1892, was $2.12½, and states that it unhesitatingly charges all bills against other roads at this figure.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

This is parallel to case No. 157, Alabama & Vicksburg Railway Company versus the Chicago, Burlington & Quincy Railroad Company, and the same argument applies to this case also.

Mr. Rhodes being interested in this case, was not a party to the decision.

ARBITRATION CASE NO. 159.

TRANSOM BROKEN ON INDIVIDUAL'S CAR.

CUDAHY PACKING COMPANY

versus

SAN ANTONIO & ARANSAS PASS RAILWAY COMPANY.

On July 30, 1892, the Cudahy Packing Company rendered a bill against the San Antonio & Aransas Pass Railway Company based upon card issued by the latter company for one broken transom on C. O. T. Line car No. 20. The S. A. & A. P. R. Co. returns the bill, and states that that company is not responsible under Rule No. 10, as the car was not in any wreck, and the transom broke under fair usage.

In further correspondence between the parties the Cudahy Packing Company claims that the issue of the card by the S. A. & A. P. R. Co. is evidence that its inspector considered that company responsible for the broken transom, as otherwise he would not have given the card, and it also claims that a card once issued by a railroad company without protest renders it liable for the work done upon that card.

The S. A. & A. P. R. Co. also further claims that the Arbitration Committee has decided a similar case, No. 113, and it says that it is often compelled to card cars for defects that it is not responsible for, simply to get the car off the line.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

Rule No. 10 fixes the responsibility for parts worn out under fair usage on individual cars upon the owners.

There was nothing on the cards showing that the transom or body bolster was broken by accident, therefore the individual car owner could not, under these circumstances, charge the railroad company with the cost of making the repairs.

Rule No. 8, paragraph " d," makes the car owner responsible for body bolsters when the breakage is not caused by derailment or wreck of the car. This rule, therefore, applies to railroads as well as to individual companies. The fact that a defect card was given is simply proof of ignorance on the part of the inspector giving it or requiring it, and said card cannot be taken advantage of to charge a railroad company for something which, under the rules, it is not responsible for.

The committee is, therefore, of the opinion that the bill rendered by the Cudahy Packing Company against the S. A. & A. P. R. Co. should be canceled.

ARBITRATION CASE NO. 160.

WRONG DRAWBAR. CREDIT FOR ON INDIVIDUAL'S CAR.

CHICAGO & ERIE RAILROAD COMPANY

versus

NELSON MORRIS & CO.

Nelson Morris & Co. rendered a bill on November 7, 1892, against the Chicago & Erie Railroad Company, based upon a defect card issued by the latter company, dated November 3, 1892, calling for one wrong drawbar on Morris & Co. car 6146. The bill contained a credit for the old drawbar removed, at ¾ cent per pound. The C. & E. objects to this credit, stating that the rule under which the bill is rendered provides that a credit should be allowed for the full value new of the material in the bar at the rates fixed under Rule No. 26.

Nelson Morris & Co. states that it cannot afford to 'pay 2 cents per pound for something which it does not want, and for which it can only get ½ cent per pound, and says it would like to make arrangements with the C. & E. R. R. Co. to take all such drawbars which Nelson Morris & Co. remove from its cars on C. & E. defect cards.

Both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

This is parallel to Case No. 156, N. Y. C. & H. R. R. R. Co. versus Nelson Morris & Co., and the same argument applies.

ARBITRATION CASE NO. 161.

REPAIRS NOT CONFORMING TO ORIGINAL DESIGN.

UNION PACIFIC SYSTEM

versus

PITTSBURGH & WESTERN RAILWAY COMPANY.

The body of Union Pacific car No. 37,969 was destroyed on the line of the Pittsburgh & Western Railway, and the trucks were returned to the Union Pacific System in a defective condition, with a defect card enumerating a portion only of the defects which existed. The U. P. Co. called the attention of the P. & W. Co. to the other defects upon the trucks, among which were two wrong truck timbers. The P. & W. Co. finally authorized the charge for all of the additional defects on these trucks, with the exception of the item of two wrong truck timbers, acknowledging at the same time that they had put in two truck timbers, but that they were made the same size exactly as those destroyed in the trucks. The U. P. Co. states that the original truck timbers had shrunk ¾ of an inch, and that in applying new truck timbers, the P. & W. R. people framed them the same size as the shrunken timbers removed, and it says further that the material applied was green, and that in time it will probably shrink ¾ of an inch, so that the timbers in the truck will then be 1½ inches narrower than the standard truck timbers, and it further claims that the P. & W. should have made these truck timbers as thick as the irons indicated they should be, and it argues that should the timbers in these trucks be damaged consecutively several times in such a manner as to cause their removal, and the timbers should each time be framed the same size as the timbers removed, there would eventually be no thickness left in the timbers.

The P. & W. Co. claims that it renewed the broken timbers with others of exactly the same size as the ones removed, which is all that is demanded by the rules, and declines to authorize the change of the two truck timbers.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

Rule No. 11 provides that when foreign cars are repaired the work must be thoroughly done, and in conformity with the original construction or design.

It appears from the correspondence in this case that the work done by the P. & W. Co. did not conform to the provisions of this rule, and although the timbers used were of the same dimensions as those broken, yet they did not conform to the design, as indicated by other parts ot the truck.

It is clear to the committee that the work was not done with that thorough care enjoined by the rule.

In case of doubt as to the design, the road intending to make repairs can get information from the owner, and it is its duty to procure it.

The committee is of the opinion that the P. & W. Co. should pay for the necessary repairs to the truck in question to restore it to its original standard.

ARBITRATION CASE NO. 162.

BOLSTER DECAYED. OWNER RESPONSIBLE.

CANADIAN PACIFIC RAILWAY COMPANY

versus

INTERCOLONIAL RAILWAY OF CANADA.

Car No. 5,229, belonging to the Intercolonial Railway of Canada, was found on the Canadian Pacific Railway to have decayed bolsters. The C. P. R. Co. asked the I. R. Co. for a home card, so it could send the car home, suggesting at the same time that if the owner, on examination of the car after its arrival home, found that the C. P. R. was responsible for any damage which had been done it could make the repairs and send bill to the C. P. R. Co. for same, or, if the owner preferred, the C. P. R. Co. would make the necessary repairs without sending the car home, and charge for the actual cost of same.

The I. R. Co. replied that it would accept the car back again in accordance with the M. C.-B. rules, and that if the car was damaged, the C. P. R. Co. inspector was at fault in accepting it.

In further correspondence, the C. P. R. Co. explained that the outside appearance of the car was good, but when floor is raised it can be seen that the bolster is decayed, and not fit to run. The I. R. Co. does not make any further argument in support of its position, but both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule No. 11 provides that when cars are unsafe on account of the general worn-out condition, due to age or decay, they should be reported to the owner, who must provide home cards to secure the return of the car.

The C. P. R. Co. complied with this rule, which should also have been complied with by the I. R. Co.

From the evidence submitted it does not appear that the C. P. R. Co. is responsible for any damage, the question hinging entirely on age and decay.

The committee is, therefore, of the opinion that the I. R. Co. should comply with the rule cited.

Arbitration Case No. 163.

JOURNAL BEARINGS IN NEW CARS RENEWED ON ACCOUNT OF HEATING.

NEWPORT NEWS & MISSISSIPPI VALLEY COMPANY

versus

AUSTIN & NORTH-WESTERN RAILROAD COMPANY.

The Newport News & Mississippi Valley Company rendered a bill against the Austin & North-Western Railroad for renewing one journal bearing in each of two new A. & N.-W. box cars which were en route from the shops where they were built to the owning road for service.

The A. & N.-W. R. R. Co. objects to the bill because these cars were just out of the shops, and claims that if they had been properly oiled these brasses would not have needed renewal; it also says that inasmuch as the brasses were broken and not worn out they are not chargeable under Rule No. 8.

The N. N. & M. V. Co., on the other hand, contends that the journals were properly lubricated, and that the failure of these parts was due either to poor brasses or bad workmanship, for which it is not responsible, and it claims that it is perfectly justified in rendering bill under Rule No. 8.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

Rule No. 8 provides that car owners shall be chargeable Sec. (c) with journal bearings worn out.

The A. & N.-W. R. R. Co. claim that the bearings were not worn out; that the cars were new, and that they were on their way from the manufacturers to be turned over to the owning road.

The N. N. & M. V. Co. does not claim that the bearings were worn out, but that this breakage was due to heating, which it attributes either to poor workmanship or bad material.

It is clearly established that the failure was due to heating. Trouble of this character may be avoided by careful handling and lubrication of cars, and every railroad is bound to give sufficient attention to prevent such occurrences in foreign cars, as well as in its own. (See Rule No. 1.) Its failure to do so renders it liable for the consequences.

It is the opinion of the committee that the N. N. & M. V. R. R. Co. was at fault in this case, and that its bill should be canceled.

ARBITRATION CASE NO. 164.

WRONG DRAWBAR. CREDIT FOR ON INDIVIDUAL'S CAR.

MISSOURI PACIFIC RAILWAY COMPANY
versus
NELSON MORRIS & CO.

Nelson Morris & Co. rendered bills on various dates in September and October, 1892, against the St. Louis, Iron Mountain & Southern Railway, operated by the Missouri Pacific Railway Company, for work done on defect cards applied to Morris & Co's cars by the St. L. I. M. & S. R. Co., calling for wrong drawbars. In rendering these bills Nelson Morris & Co. allowed scrap credit at ¾ cent per pound for the cast iron in the drawbars. To this credit the M. P. R. Co. objects, and claims that a credit should be allowed for the full value new of the wrong drawbars removed from the cars.

Nelson Morris & Co. claims that it cannot in justice to itself allow 2 cents per pound for the drawbars removed, as it has no other use for them than to throw them into the scrap heap and get but ½ cent per pound for them.

After further correspondence on this subject between the two parties the matter is, by mutual consent, referred to the Arbitration Committee, and both parties agree to abide by its decision.

DECISION.

This is parallel to case No. 156, N. Y. C. & H. R. R. R. Co. versus Nelson Morris & Co., and the same argument applies.

ARBITRATION CASE NO. 165.

TRUCKS RETURNED FROM INDIVIDUAL'S CAR DESTROYED. POINT OF DELIVERY.

ATCHISON, TOPEKA & SANTA FÉ RAILROAD COMPANY
versus
AMERICAN REFRIGERATOR TRANSIT COMPANY.

On September 8, 1892, the Atchison, Topeka & Santa Fé Railroad Company destroyed the body of U. R. T. car 6369 operated by the American Refrigerator Transit Company, and in making settlement for same it elected to return the trucks.

The A. T. & S. F. R. R. Co. states that the car was received by it the last time before its destruction at Joliet, and offered to return the trucks to the A. R. T. Co. at that point, or if the A. R. T. Co. preferred, to deliver them to the Wabash R. R. Co. at Lexington Junction. To this the A. R. T. Co. replied that under Rule No. 24 trucks should be sent to the nearest point, and that in this case the nearest point is St. Louis, where that company has its shops, and asks to have the trucks forwarded to St. Louis and delivered free of freight charges.

The A. T. & S. F. R. R. Co. objects to doing this, and claims that it is obliged by the rules only to deliver the trucks free of freight or other charges to the nearest point on the road of the company owning the car, and as the A. R. T. Co. is not a railroad company it does not understand that they must pay the freight to St. Louis.

The A. R. T. Co. does not accept the offer of the A. T. & S. F. R. R. Co. to deliver the trucks either at Joliet or Lexington Junction, except by implication, as the letter in which this proposal was made was answered, and the only reply to this inquiry was, " Please say when the trucks in question will be shipped."

The A. T. & S. F. R. R. Co. again wrote to the A. R. T. Co. after this reply had been received, stating that the trucks had been billed to the care of that company at St. Louis, collect, and suggesting that it pay the freight charges, and if it still considered that the trucks should be delivered to St. Louis free of charge, it could render bill against the A. T. & S. F. R. R. Co. for the amount, which it would refuse to pay, and the case would then be in shape to refer to the Arbitration Committee. This course was followed, and in November, 1892, the A. R. T. Co. rendered bill against the A. T. & S. F. R. R. Co. for freight charges on trucks belonging to car 6369 destroyed on the A. T. & S. F. R. R. Co. September 8, 1892, as per bill of Wiggins' Ferry Co. attached, $9.00 and switching charges paid to St. L. I. M. & S. R. Co. $1.50, total $10.50. This bill was declined by the A. T. & S. F. R. R. Co., which then submitted its argument to the A. R. T. Co. sustaining its position, and the latter company forwarded the same to the Arbitration Committee with its argument sustaining its own position.

The A. T. & S. F. R. R. Co. states that the bill is declined for various reasons, among which it states that the A. R. T. Co. is not in a position to render an equivalent service, as it is not a railroad company and it does not destroy cars, and that it is therefore not equitable that the A. T. & S. F. R. R. Co. should be subject to any freight charges over other lines, but that it ought to be satisfied if the trucks were delivered at the point where the car was received, or to the Missouri Pacific Railway or the Wabash Railroad, as it has already offered to do, because it claims that the letter-heads on which the A. R. T. Co. conducted this correspondence state in print that the A. R. T. Co. is owned and operated by the Missouri Pacific Railroad Company and Wabash Railroad Company, both of which companies connect with the A. T. & S. F. R. R. and to one of which it had already offered to deliver the trucks free of charge.

The A. T. & S. F. R. R. Co. further argues that when a railroad company delivers the trucks of a destroyed car to another railroad company it may deliver them to the nearest point on the line of the railroad company owning the car, and this generally, or at least frequently, entails a haul by the owning company before it can get these trucks to a shop point on its line where they will be useful, which haul they have to perform at their own expense, and it claims that the A. R. T. Co. should be willing to make a similar haul of its own trucks over roads handling the car in order to get them to the shop where they are wanted.

The A. R. T. Co. says that the American Refrigerator Transit Company is an independent corporation, chartered in Illinois, although both the Missouri Pacific and Wabash Railroads are large stockholders. It refers to Arbitration Case No. 96 to sustain its position, and claims that this case is a complete answer to the claim of the A. T. & S. F. R. R. Co. that a delivery to the M. P. R. R. or W. R. R. would constitute a delivery to the A. R. T. Co. The A. R. T. Co. also refers to Case No. 3 of the decisions of the Arbitration Committee in May, 1888. (See report of proceedings of the Twenty-second Annual Convention of the Master Car-Builders' Association, 1888, page 153.)

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

Rule No. 24 makes no provision for the return of trucks to the owners of individual cars, but it requires that if a company destroys a car and elects to return the trucks that it should deliver them free of freight or other charges to the nearest point on the road of the company owning the car. Following the same practice in similar cases where cars belong to individual companies, it would seem fair to require the trucks to be delivered to some shop of such individual company, as it does not seem equitable that the car owner should, by reason of its car being destroyed while in service, and for the benefit of a railroad company, be put to expense on account of the return of such materials. In so far as the committee is advised, U. R. T. cars are neither owned nor operated by the Missouri Pacific nor Wabash Railroad Companies, therefore the committee is of the opinion that these trucks should be returned to the nearest shop designated by the owners or operators of the car in question.

ARBITRATION CASE NO. 166.

WRONG DRAWBAR. DISPUTED RESPONSIBILITY FOR.

CHICAGO GREAT WESTERN RAILWAY COMPANY

versus

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY COMPANY.

On March 23, 1892, the Chicago, St. Paul & Kansas City Railway Co., now the Chicago Great Western Railway Co., rendered bill against the Chicago, Rock Island & Pacific R. R. Co. for repairs of C. St. P. & K. C. R. R. car 9268 based upon a defect card bearing date of January 7, 1892, issued by the C. R. I. & P., calling for "One cast drawbar with stem, in place of cast drawbar with pocket; two wrong followers, same spring used."

The C. R. I. & P. objects to the payment of this bill and claims that it should be canceled, because they say that the car was received from the C. St. P. & K. C. on December 31, 1891, with the same defects that the card was issued for in error.

The Chicago Great Western states that such was not the fact, and that its records show that the car was delivered to the C. R. I. & P. R. at Chicago, December 31, 1891, in good order. Further correspondence between the two parties to the dispute shows the following points:

The C. R. I. & P. R. states that the car in question was received from the Kansas City Line at the C. R. I. & P. Twelfth street yard, December 31, 1891, with one drawbar broken, according to its records. It further states, in regard to the movement of the car, that it came from Twelfth street, loaded, and went to Englewood to unload, a distance of about seven miles, on a switching charge. On its return it was switched by the C. R. I. & P. to its repair tracks, and as the defects were new and all bad order marks washed off the car, its foreman not knowing the circumstances, and not seeing any bad order marks on the car to show that it came from some other line in a defective condition, made the repairs with these wrong materials on the presumption that the car was damaged by the C. R. I. & P. Co.

The Chicago Great Western R. states that its records show that the car arrived off its line O. K. and was delivered to the C. R. I. & P. in the same condition; that it was delivered loaded and was taken to Englewood to unload, and when it returned to the Chicago Great Western it had these wrong materials on it with a card covering the responsibility.

The C. R. I. & P. further argues that if their bad order marks had not been washed off by the rain the car would have been delivered back to the Chicago Great Western in the same condition as when received.

As there seems to be a conflict of the records of the two roads in dispute about the condition of the car at the time of its delivery to the C. R. I. & P., and as such delivery was made over the Chicago & Northern Pacific Railway in Chicago, between Taylor street and Twelfth street, the Chicago Great Western shows in correspondence with the Chicago & Northern Pacific R. R. Co. that the car was delivered to the C. R. I. & P. in the same condition as it was received from the C. St. P. & K. C., although this showing is only through the statement of the engineer and conductor of the crew which handled the car.

After further correspondence, which failed to adjust the matter, the parties agree to refer it to the Arbitration Committee for decision.

DECISION.

The Chicago Great Western Railway Company renders bill against the Chicago, Rock Island & Pacific Railway Company, upon the authority of a defect card issued by the latter road, covering defects or damage existing on C. St. P. & K. C. car No. 9268 when delivered to the C. G. W. by the C. R. I. & P. The latter disputes the bill, on the ground that the card was given by mistake, that the defects existed when the car was received by it from the C. G. W. Co. The latter company denies that the car was in bad order when delivered by it.

The defense made by the C. R. I. & P. has no bearing in the case. If the car was in bad order when offered to it, it was privileged to require a defect card. As it did not do so, and further, gave its own defect card, it acknowledged responsibility, and therefore, should accept the bill.

ARBITRATION CASE NO 167.

WRONG DRAWBAR. CREDIT FOR.

KEOKUK & WESTERN RAILROAD COMPANY
versus
ATCHISON, TOPEKA & SANTA FÉ RAILROAD COMPANY.

Under date of September, 1892, the Keokuk & Western Railroad Company rendered bill against the Atchison, Topeka & Santa Fé Railroad Company, including therein some charges for changing wrong drawbars put into K. & W. cars and carded by the A. T. & S. F. R. R. Co. under date of September, 1892, and in deducting credits for scrap the K. & W. R. R. Co. allowed ¾ cent per pound as the value of these wrong drawbars removed.

The A. T. & S. F. R. R. Co. states that, according to the rules in effect at the time the cards were issued, it should be allowed a credit for drawbars at the same price as the new material, namely, cast iron, 2 cents per pound, and malleable iron 4 cents per pound.

The K. & W. R. R. Co. objected to this, and stated that the drawbars removed are of no value to it except as scrap, and that if it allowed such credits for the old materials removed, the transaction would figure a considerable net loss to it in restoring standard drawbars to its cars. It also argues that the A. T. & S. F. R. R. Co. places a wrong interpretation on the last sentence of Rule No. 19, which says "in case a foreign drawbar, etc.," and states that its understanding is that the whole paragraph refers to repairs of foreign cars, and it understands this last sentence to mean that "in case a foreign drawbar is removed from a foreign car."

After further correspondence and failure to come to an agreement as to the proper settlement of the bill, both parties agree to refer it to the Arbitration Committee and to abide by its decision.

DECISION.

Rule No. 19 clearly states that in case a foreign drawbar is removed from a car upon a defect card a credit shall be allowed for the full value new of the material in the bar, at the rates fixed in Rule No. 26.

There is no room for a misunderstanding as to the meaning of this rule, which applies alike to individual cars and to cars of railroad companies.

It is the opinion of the committee that the claim of the A. T. & S. F. R. R. Co. for credit on wrong drawbars removed at the rates fixed in Rule No. 26 is in accordance with Rule No. 19.

ARBITRATION CASE NO. 168.

TRUCK SPRING "GONE" AND OWNER CHARGED FOR REPLACEMENT.

DELAWARE & HUDSON CANAL COMPANY
versus
CANADA ATLANTIC RAILWAY COMPANY.

The Delaware & Hudson Canal Company rendered a bill against the Canada Atlantic Railway Company March 10, 1892, for repairs to C. A. car 5250, as per Rule 8, as follows:

1 truck spring, 172 pounds, at 5 cents	$8.60
20 pounds wrought hangers, at 4 cents	80
10 hours labor, at 20 cents	2.00
Total	$11.40

The bill contains a notation, "no scrap, spring gone." The C. A. R. Co. objects to paying this bill, stating that the rules do not justify a charge for a spring "gone," although they provide for springs "broken," and state that the fact that the spring was gone indicates that the car was not carefully inspected, or the need for repairs would have been discovered before the spring was lost.

The D. & H. C. Co. argues that the swingbeam hanger broke while the car was in transit, causing the loss of the spring, and that their bill is made in accordance with Rule 8, paragraph (d), and is correct.

After further correspondence, in which the C. A. R. Co. refers to Arbitration Committee Case No. 143 as somewhat similar to the one in question, the matter is referred by mutual consent to the Arbitration Committee for decision.

DECISION.

The D. & H. C. Co. bases its claim upon Rule No. 8, paragraph (d), which makes car owners responsible for truck or body bolsters, spring plank or truck springs broken.

The correspondence submitted does not show that any of the parts named in the rule were broken. The truck spring was missing, and its loss is attributed by the D. & H. C. Co. to the breakage of a swingbeam hanger.

As the car owner is not responsible for the breakage of that part it must seem clear that it cannot be held responsible for others which may be damaged or destroyed in consequence of the failure of that part.

The claim of the D. & H. C. Co. is one of consequential damage, which is not countenanced by the rules, and the committee is, therefore, of the opinion that the bill is not proper.

See Arbitration Case No. 137.

ARBITRATION CASE NO. 169.

BRAKE SHOES AND JOURNAL BEARINGS. CHARGE FOR LABOR IN RENEWING ON INDIVIDUAL'S CARS.

TEXAS & PACIFIC RAILWAY COMPANY

versus

THE BURTON STOCK CAR COMPANY.

In October, 1892, the Texas & Pacific Railway Company rendered bill against the New England Car Company, which is a part of the Burton Stock Car Company, for repairs to cars during September, 1892, as per M. C.-B. Rule 10, in which bill charges are made for renewals of brake shoes and journal bearings, including labor charge at the rates prescribed by the rules. Also, credits are allowed for the actual weights of the brass and cast iron removed at the rates of credit provided by the rules for scrap brass and scrap cast iron.

The Burton Stock Car Co. objects to the bill, claiming that it should not be charged for labor of renewal of journal bearings and brake shoes, and that M. C.-B. Rule No. 8 expressly provides for this. It also says that it should be allowed an arbitrary scrap credit for one-half the weight of the journal bearings applied, instead of the scrap credit of the actual weight of the bearings removed.

The T. & P. R. Co. objects to making this change in the bill, and claims that M. C.-B. Rule 8 does not in any way apply to private car companies, but that Rule 10 provides for all such repairs or renewals where cars belong to private companies.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

The refusal of the Burton Stock Car Company to pay for labor of renewing brake shoes and journal bearings is based upon Rule 8, which provides that car owners shall be chargeable with certain repairs and that charges shall not include labor in certain instances. Rule No. 10 provides that certain repairs shall be made at the expense of individual car owners. It would seem that the items specifically provided for have to be treated in a certain way for all car owners in Rule 8, and are to be treated under that rule instead of under Rule 10. The committee is therefore of the opinion that Rule 8 is applicable to individual car companies as well as to railroad companies, and that bills for renewing the journal bearings and brake shoes should be made out accordingly.

ARBITRATION CASE NO. 170.

WRONG DRAWBAR. CREDIT FOR ON INDIVIDUAL'S CAR.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY COMPANY

versus

HAMMOND REFRIGERATOR LINE.

On December 13, 1892, the Geo. H. Hammond Co. rendered bill against the Chicago, Milwaukee & St. Paul Railway Co. for replacement of wrong drawbar on H. R. L. car 0777, carded by the C. M. & St. P. R. Co. as follows: "One malleable iron drawbar No. 1069, in place of one cast drawbar." On this bill the drawbar removed was originally credited at ½ cent per pound, and subsequently corrected in red ink to 2 cents per pound, but the C. M. & St. P. R. Co. would not pay the bill, claiming that under M. C.-B. Rule 19 it should have 4 cents per pound credit for the malleable iron drawbar removed.

The Hammond Refrigerator Line claims that this rule cannot be held to apply to private car lines, and that if it were obliged to be governed by it it would be paying a premium for the privilege of repairing its cars. It however agreed to change the credit originally allowed of ½ cent per pound to 2 cents per pound, but does not consent to allow 4 cents per pound as claimed by the C. M. & St. P. R. Co.

The C. M. & St. P. R. Co. claims that it should be credited with 4 cents per pound for the wrong malleable drawbar as per the rules. Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

This case is similar to Arbitration Case No. 156, New York Central & Hudson River R. R. Co. vs. Nelson Morris & Co., and the same argument applies.

Arbitration Case No. 171.

BENT AXLE. RESPONSIBILITY FOR.

New York, Lake Erie & Western Railroad Company

versus

American Refrigerator Transit Company.

In May, 1892, the New York, Lake Erie & Western Railroad Co. rendered bill against the American Refrigerator Transit Co. for wheel and axle work on U. R. T. Co. car 6401, operated by the A. R. T. Co. The cause of removal, as stated on the bill, was "Axle bent under fair usage; axle scrap, wheels good." The amount of the bill was correct as per rules for such work when properly chargeable, but the A. R. T. Co. claims that it is not properly chargeable for this work; that the axle was up to the standard size of the Master Car-Builders' Association for cars of 40,000 pounds capacity, which this car was marked, and it further claims that the car must have been derailed or otherwise unfairly handled in order to bend this axle, or else that the M. C.-B. standards are not what they should be.

The N. Y. L. E. & W. R. R. Co. admits that the axle was up to the standard requirements of the size for cars of this capacity, and shows by its records that the car was loaded with 26,600 pounds when the bent axle was detected. It further states that the car was not derailed or unfairly handled, but that nevertheless the axle was found to be bent close to one wheel, and it refers to Arbitration Case No. 85 to sustain its position that the A. R. T. Co. should pay the bill.

The A. R. T. Co. further argues that Arbitration Case No. 85 is not a parallel case, as in that case there was nothing to show the committee the size of the axle.

The N. Y. L. E. & W. R. R. Co. further argues that under Rule 9 the owner should pay for axles bent or broken or with collars worn off under fair usage, and that the rule does not exempt owners from this responsibility if the axles conform to the M. C.-B. limits.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

Rule No. 9, under axles which are chargeable to the companies owning the car, paragraph (b), enumerates "axles bent or broken, or with collars worn off by fair usage." Inasmuch as it is shown that the car in question was not derailed or maltreated, it is the opinion of the committee that the car owner should pay the cost of renewing the bent axle.

ARBITRATION CASE NO. 172.

TRUCKS RETURNED FROM CAR DESTROYED. POINT OF DELIVERY.

NORTHERN CENTRAL RAILWAY COMPANY

versus

WESTERN NEW YORK & PENNSYLVANIA RAILROAD COMPANY.

The body of Northern Central Railway Company car 8464 was destroyed on the Western New York & Pennsylvania Railroad Company lines, and the trucks were returned to the N. C. R. Co. by the N. Y. C. & H. R. R. R. Co., with freight prepaid from Buffalo to Canandaigua, and billed in accordance with instructions of the Superintendent of Motive Power of the N. C. R. Co. to the N. C. R. Co., care of G. W. Demarest, Baltimore, Md. A dispute arose over the proper freight charges on these trucks, in which the N. C. R. Co. claims that Sunbury, Pa., is the nearest point on its line, and that the trucks should be delivered free to Sunbury instead of to Canandaigua, and it cites Arbitration Case No. 96 in support of its position. The N. C. R. Co. further states that the line between Canandaigua and Williamsport is composed of two distinct corporations; the Elmira & Lake Ontario Railroad Company owning the line between Canandaigua and Elmira; the Elmira & Williamsport Railroad Company owning the line between Elmira and Williamsport. Both of these corporations lease their railroads to the N. C. R. Co., whose line runs only from Sunbury, Pa., to Baltimore, Md. The line between Williamsport and Sunbury is the Philadelphia & Erie Railroad, operated by the Pennsylvania Railroad Company. The lines north of Williamsport, namely, the E. & W. R. R. Company and the E. & L. O. R. R. Company own no freight cars, but are charged mileage on the N. C. cars passing over these roads. The owner of N. C. R. car No. 8464 is the N. C. R. Co., whose line runs only between Sunbury, Pa., and Baltimore, Md.

The W. N. Y. & P. R. R. Co. claims that Arbitration Case No. 96 is not a parallel case, as in that case the trucks were of a distinctly different road, different name, and operated distinctly independent of the road over which freight charges were claimed. It further states that if the N. C. R. connecting with the N. Y. C. & H. R. R. R. is not the railroad company which owns N. C. R. car 8464, then they are willing to pay the additional freight charges, so as to deliver the trucks to the line of the company owning the car, as provided in the rules.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

It is acknowledged by the N. C. R. Co. that that company operates a railroad running into Canandaigua under a lease, and that the car in question is owned by the N. C. R. Co.

It is the opinion of the committee that the delivery of the trucks in question at Canandaigua free of charge is in conformity with the rules. If the N. C. R. Co. did not wish to pay freight on these trucks from Williamsport to Sunbury it should not have directed the trucks to be consigned to Baltimore.

ARBITRATION CASE NO. 173.

WRONG DRAWBAR ON INDIVIDUAL'S CAR REPLACED AND CHARGED BY A RAILROAD COMPANY.

DES MOINES, NORTHERN & WESTERN RAILWAY COMPANY

versus

CHICAGO, ROCK ISLAND & PACIFIC RAILROAD COMPANY.

On May 28, 1892, the Des Moines & Northern Railway Company rendered a bill against the Chicago, Rock Island & Pacific Railway Company, based upon card issued by the C. R. I. & P. R. for M. D. T. car 3796, calling for one wrong drawbar and one broken hinge. This bill was rendered in accordance with the decision in Arbitration Case No. 94, which was a dispute between the Lake Shore & Michigan Southern Railroad Company and the Des Moines & Northern Railway Company, and in which the Arbitration Committee held that the case was not as between these two companies, but as between the Chicago, Rock Island & Pacific Railway Company and the Des Moines & Northern Railway Company.

The facts of the case were that the Des Moines & Northern Railway Company issued its own card on M. D. T. car 3796, which was removed from the car by the L. S. & M. S. R. Co. and the repairs made to the car and bill rendered by the latter company against the D. M. & N. R. Co. After the receipt of the bill with card attached, the D. M. & N. R. Co. detached the card and substituted a card of the C. R. I. & P. R. Co., which it had procured after the car had passed the inspection point, in which the C. R. I. & P. R. Co. acknowledged the responsibility for the damage. It appears that the D. M. & N. R. Co. finally paid the L. S. & M. S. R. Co's bill and now renders bill against the C. R. I. & P. R. Co. to recover the amount paid.

The C. R. I. & P. R. Co. does not dispute the validity of its card issued in this way, but claims that the wrong drawbar should not have been removed by the L. S. & M. S. R. Co., and that the Arbitration Committee has decided several such cases, saying that the wrong drawbar could only be replaced by the owner of the car.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

The argument of the Chicago, Rock Island & Pacific Railway Company that the Arbitration Committee has decided cases by saying that the wrong drawbar could only be replaced by the owner of the car, is not applicable to this case, inasmuch as the committee is advised that the Lake Shore & Michigan Southern Railway Company acted as agent for the owner in this case, and that the car in question was offered to the N. Y. C. & H. R. R. Co. at Buffalo, which company would not take it until the wrong drawbar had been replaced by one standard to the car. Arbitration Cases Nos.

89 and 91 are parallel cases, and it is therefore the opinion of the committee that the Chicago, Rock Island & Pacific Railway Company should pay the bill rendered by the Des Moines, Northern & Western Railway Company.

JNO. W. CLOUD,
Secretary.

CHICAGO, Ill., February 28, 1893.

NOTE.—The Arbitration Committee requests that all suggestions of desirable modifications in the Rules of Interchange should be communicated to the Secretary before May 10, 1893, so that the Arbitration Committee may consider them at its next meeting, which will be held soon after that date.

MINUTES OF MEETING HELD IN CHICAGO, MAY 17, 1893.

Members present—G. W. Rhodes, M. M. Martin and John Mackenzie.

Mr. J. W. Marden who could not attend the meeting, subsequently concurred in these decisions.

ARBITRATION CASE NO. 174.

SPRING STEEL. PRICE UNDER RULES OF 1891.

THE MISSOURI PACIFIC RAILWAY COMPANY
versus
HANNIBAL & ST. JOSEPH RAILROAD COMPANY.

On December 2, 1892, the Hannibal & St. Joseph Railroad Company rendered bill against the Missouri Pacific Railway Company, including an item based upon a card issued by the M. P. R'y Co. and attached to C. B. & Q. car 25244, calling for "two draft springs broken, O. D." The H. & St. J. R. R. charged 5 cents per pound for the draft springs used in repairing the defects called for by this card. The M. P. R'y Co. objected to this charge, saying the charge for springs should be $1.25 each, the manufacturer's net price, instead of $1.60 each, as charged.

The H. & St. J. R. R. claims that the price of 5 cents per pound is correct, as this is the price called for by M. C.-B. Rule No. 26, of 1891, which was in force at the date of the card, August 12, 1892.

The M. P. R'y Co. still claims that the springs should be charged at manufacturer's prices, and not charged at 5 cents per pound, and refers to Arbitration Cases Nos. 3, 5 and 133, in which the Arbitration Committee claimed that manufacturer's price should rule. To this the H. & St. J. R. R. replies that Arbitration Cases Nos. 3 and 5 do not refer to coil springs, but to elliptic springs, and that Arbitration Case No. 133 was decided on the rules which went into effect in September, 1892, and that prior to that date 5 cents per pound could be charged for coil springs.

As the parties to the dispute have failed to come to an agreement in the matter, they agree to abide by the decision of the Arbitration Committee.

DECISION.

The card in dispute bore date of August 12, 1892, and the decision is therefore based upon the rules in force at that date, which provided that 5 cents per pound shall be charged for spring steel. It is the opinion of the committee, therefore, that the bill rendered is correct, and should be paid.

Mr. Rhodes being interested in this case, was not a party to this decision.

ARBITRATION CASE NO. 175.

CARD LOST. DUPLICATE ISSUED, BUT NOT EXACT COPY.

SOUTHERN PACIFIC COMPANY (PACIFIC SYSTEM)
versus
NEW YORK, LAKE ERIE & WESTERN RAILROAD COMPANY.

On January 4, 1892, the Southern Pacific Company rendered bill against the Chicago & Erie Railroad Company for certain work done on S. P. car 36811 upon a defect card dated November 13, 1891, issued by the C. & E. R. R., marked "duplicate" and calling for "One platform end sill and one draft timber split, and wrong Miller hook," amount after credits are deducted, $18.03.

The N. Y. L. E. & W. objects to the bill on the ground that the card upon which this bill is based is marked "duplicate" and states "to replace U. P. card removed." They find upon investigation that the car was received from the C. M. & St. P. R'y at Chicago, September 18, 1891, the defects being covered by a card issued by the joint inspector at Ogden, Utah, on account of the S. P. Co., September 15, 1891, for one platform sill split, one draft timber split and mixed *S. P.* Miller hooks. They further state that the inspector at Chicago was in error in advising that the card removed was a U. P. card, but that he should have stated that it was an S. P. card. The N. Y. L. E. & W. states that by some means the card was lost while the car was east, and that when it returned again to the west it issued the card on which this bill is based and marked it as above noted, and therefore it claims that it is not responsible for the damaged condition of the car.

The S. P. Co. claims that the card issued by the C. & E. R. R. is not a duplicate of the one which was on the car when it left its line; that the card which it placed upon the car differed in regard to the Miller hook from the C. & E. R. R. card in that it called for one wrong *S. P.* Miller hook. It claims that the wrong Miller hook which was on the car when it returned to them was not an S. P. Miller hook at all, and it had therefore to be exchanged for its standard. After further correspondence in the matter, in which the N.Y. L. E. & W. shows by tracing the car past its different shops that no change was made in the Miller hooks at those points, and in which the S. P. Co. finally cancels all charges in the bill except that for the Miller hook, amount $13.05, which it still continues to press, both parties agree to submit the matter to the Arbitration Committee for decision.

DECISION.

The M. C.-B. card is a voucher authorizing work to be done. Its advantages depend wholly on its carrying with it this value. Were it not to carry this value, it would cease to be recognized and consequently would not be of any advantage in expediting the movement of freight. It is a well recognized fact that railroad companies are not always responsible for the damage named on the defect cards they issue. Only in very exceptional cases should the obligations incurred by a defect card be canceled.

In the case in point, the issuing of the card was not done ignorantly, nor was it contrary to any M. C.-B. rule. The card was issued under an order from the Assistant Superintendent Motive Power of the Erie R. R. to expedite the movement of the car, he trusting that the line he supposed had originally issued the card would return his card or voucher without making any collection. This the Southern Pacific only does in part. While it acknowledges the lines east of Ogden accepted its car with two kinds of Miller drawbars (S. P.), it claims one of the Miller bars returned with the car was not a Southern Pacific bar.

In the opinion of the committee the M. C.-B. rules sustain the Southern Pacific in its position and their bill should be paid.

ARBITRATION CASE NO. 176.

SILL REPLACED. IMPROPER CHARGE FOR PREPARING SILL.

THE UNION PACIFIC RAILWAY COMPANY

versus

NORTHERN PACIFIC RAILROAD COMPANY.

On December 12, 1892, the Union Pacific Railway Company rendered bill against the Northern Pacific Railroad Company, based on a defect card issued by the latter company, calling for one intermediate sill cracked, as well as some other items. The N. P. R. R. Co. objected to the charge for the renewing of sill because of the charge being made for manufacturing the sill as well as for the lumber in the sill and the labor charge prescribed in Rule No. 26 for renewing an intermediate sill, and claims that the labor charge prescribed in this rule covers also the cost of manufacturing the sill, and that the only other charge prescribed in Rule 26 would be for the lumber actually used at 3 cents per foot.

The U. P. R'y Co. objects to making correction in the bill, and claims that it is justified in charging the cost of the sill in shape ready to put in the car, and that it has charged the sill at this cost, and inasmuch as Rule 26 prescribes 29 hours' time which may be charged for renewing the sill, it has added this charge, and in support of this position it says that Rule 26 states that it includes all items except so far as labor is already included in charge for the material, and argues that if the makers of the rule intended to charge sills at 3 cents per foot, it was not necessary to add the exception to the rule.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

The dispute in this case rests on the construction applied to the paragraph in Rule No. 26, immediately preceding the list of labor charges allowed for replacing sills and other work. The paragraph reads as follows : " The following table shows the number of hours which may be charged for labor in doing the various items of work enumerated, which includes all work necessary to complete each item of repairs, except in so far as labor is already included in charges for materials." The price allowed by the M. C.-B. Rules for the materials in the sills, namely, 3 cents per foot, is in the opinion of the committee the only charge which can be allowed in addition to the charge for the hours prescribed for labor.

The bill of the Union Pacific Railroad should, therefore, be corrected.

ARBITRATION CASE NO. 177.

CAR DESTROYED BEARING CARDS FOR NUMEROUS DEFECTS.

SOUTHERN PACIFIC COMPANY (PACIFIC SYSTEM)
versus
CHICAGO & NORTH-WESTERN RAILWAY COMPANY.

On January 4, 1893, the Chicago & North-Western Railway Company wrote to the Southern Pacific Company stating that S. P. box car 15422 was received on the C. & N.-W. R'y from the Union Pacific R'y the latter part of November, carded by the Joint Car Inspector, J. A. Gillson, for the following defects: "2 deadwoods, 3 draft timbers, 1 intermediate and 1 center sill, 1 end door rail, 1 end door guide, 1 side door stop split; 1 side and 1 end facia pieced; 12 end boards, 2 center plate bolts, ends of 14 side boards broken; mixed S. P. brake beams, 2 brake beams cut and 30 side boards scraped."

Also, on the same car was an additional card by the Union Pacific inspector at Council Bluffs, for "one side sill, one-half broken." The C. & N.-W. R'y further states that as a result of the defective condition of the car when it was received, it broke down near Glidden on the C. & N.-W. R'y and caused the destruction of the body to such an extent that it would not be justified in rebuilding it, and it asks the S. P. Co. whether it will be satisfactory if it bills against the S. P. Co. for the materials covered by these cards and pays the S. P. Co. for the value of the body.

The S. P. Co. says in reply, that as the defects for which the car was carded did not impair the safety of the car, it cannot be conceded that any of these defects was the cause of the destruction of the car, and further, that the concluding paragraph of M. C.-B. Rule No. 6 clearly states that no bills shall be rendered for repairs which have not been made. The S. P. Co. asks whether it shall render bill against the C. & N.-W. R'y for the value of the body of the car, and whether the trucks will be returned, and it gives directions for shipping the trucks in the latter event.

The C. & N.-W. R'y replies that it is not satisfied to lose the value of this car considering its defective condition when it was received, but the S. P. Co. renders statement of value as follows:

Value of body	$240.00
Less depreciation, 10 years, 4 months, 15 days	113.64
Balance	126.36
Add automatic brakes	50.00
Total	$176.36

Value of trucks	$250.00
Less depreciation, 10 years, 4 months, 15 days	118.37
Balance	131.63
Total value of car	$307.99

The C. & N.-W. R'y says it will not settle on this basis unless the S. P. Co. will agree to deduct from the amount, a sum sufficient to cover the items existing on the card at the time the wreck occurred.

The S. P. Co. declines to make such deduction, and refers to Arbitration Case No. 55, stating that the mere matter of the C. & N.-W. R'y accepting the car in the condition it was when it was offered to it is sufficient proof that it was perfectly safe to run. The S. P. Co. refers the case in dispute to the Arbitration Committee under date of March 16, 1893, and upon application to the C. & N.-W. R'y to present its side of the case if it had anything further to say, and to indicate its willingness to abide by the decision of the Arbitration Committee, that company advises that it does not agree to have this case referred to the Arbitration Committee. This fact was communicated to the S. P. Co., but it presses the case for decision regardless of the fact that the C. & N.-W. R'y does not consent.

DECISION.

This case is parallel to Arbitration Case No. 55, in which the committee held that there was no ground on which to base a bill for items enumerated on a defect card upon a car which was wrecked, because the repairs were not made.

It is therefore the opinion of the committee that the car in question should be settled for under Rules Nos. 22, 23 and 24.

Arbitration Case No. 178.

CARD MISCONSTRUED. REPAIRS MADE TO OTHER PARTS AND CHARGED.

Central Railroad and Banking Company of Georgia

versus

Norfolk & Western Railroad Company.

The Central Railroad and Banking Company of Georgia rendered a bill against the Norfolk & Western Railroad Company in October, 1892, which included charge for repairs of L. S. car 1547, as per defect card signed by C. E. Patterson, Bristol, 10.2.91. One Hinson drawbar, $11.25; two disconnecting rods, $1.60; three hours' labor, 20 cents; credit, 62 pounds malleable scrap, 31 cents. The original card does not appear with the papers. A duplicate, however, was supplied by the N. & W., 3.14.93, which reads: "One C. & O. mall. drawbar in place of Hinson; 2 disconnecting rods."

The N. & W. R. R. objects to this item of the bill, stating that the removal of the malleable drawbar on L. S. car 1547 instead of the Hinson coupler was not necessary for the safe handling of the car, and that the owners of the car are the only ones who have a right to change the drawbar at the expense of the N. & W. R. R., and asks to have the bill corrected accordingly.

The C. R. R. & B. Co. of Ga. replies that it was necessary to replace the drawbar because the defect card covering the defects called, also, for two disconnecting rods gone, and claims that it had to make the necessary repairs in replacing these connecting rods, and that they had a right to replace the drawbar at the same time, because the same card covered both defects, and therefore presses the bill for payment.

Further correspondence in the case between the two parties developed the fact that about one year after the N. & W. R. R. applied this card to the car, the C. R. R. & B. Co. of Ga. removed the card and sent in bill for repairs to the brakes and for replacing the automatic coupler, and claims that the brakes were out of order on the car, and they made the repairs to the drawbar as well, because they were under the impression that the disconnecting rods referred to on the card were the bottom brake connecting rods, and inasmuch as they had to repair these brake connecting rods, they claim the right to do all the work called for on the card because of their impression that the two disconnecting rods mentioned on the card were the brake connecting rods.

The N. & W. R. R. claims that inasmuch as the defect card was applied to the car in 1891, and that a year elapsed before the card was removed by the C. R. R. & B. Co. of Ga., it is fair to assume that the car was safe to run with this drawbar, and that under the rules none but the owners have a right to replace the drawbar on the car in order to bring it back to the original standard, unless the car is unsafe to run; it claims further that the E. T. V. & G. R'y, to which the car was delivered by the N. & W. R. R., is very rigid in its inspection of cars, and it is not likely that it would have been received with the brakes out of order without being detected by the E. T. V. & G. inspector. Also, that its own inspector at the point where the car was delivered, after referring to his records of this transaction, states that the disconnecting rods were not brake connecting rods, but the uncoupling rods of the Hinson coupler.

Both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

The committee does not find that there was a card issued calling for anything wrong with the brakes, or for any other part of the car than the coupler and its uncoupling attachments.

The fact that the N. & W. issued the card October 2, 1891, and that the Central R. R. & B. Co. of Ga. did not make the repairs until October 14, 1892, must be regarded as corroborative evidence that the missing parts are quite unlikely to have been such essential parts to the car as its brake rod connections.

It is the opinion of the committee that the Georgia Central bill for repairs to Lake Shore car No. 1547, amount $13.14, should be canceled in conformity with former decisions of the committee.

ARBITRATION CASE NO. 179.

END DOORS. CHARGE FOR CAST IRON.

MISSOURI PACIFIC RAILWAY COMPANY

versus

BURLINGTON & MISSOURI RIVER RAILROAD IN NEBRASKA.

In October, 1892, the Missouri Pacific Railway Company rendered a bill against the Burlington & Missouri River Railroad in Nebraska for work done on various defect cards, including four cases of end door gone on different cars, which were charged at $3 each, as per the rules of the interchange. The B. & M. R. R. R. in Neb. objects to the charge of $3 each for end doors, stating that the M. C.-B. rules allow $3 each for end doors applied and specify box and stock end doors, but the end doors in question are cast-iron plates, and will weigh about 40 pounds and should be charged as cast iron at 2 cents per pound instead of at $3 each. The M. P. R'y Co. replies that the price, $3 each, is what is allowed by the M. C.-B. rules, and the bill as rendered is entirely correct in this respect; that the rules do not specify that the end doors shall be made of wood. The B. & M. R. R. R. replies to this, but does not bring any further arguments bearing upon the matter, and by mutual consent the case is referred to the Arbitration Committee for decision.

DECISION.

Rule 3 provides that cars may be refused if doors are missing, which relieves car owners from responsibility for lost doors, and Rule 26 names a price of $3 each for end doors applied to box and stock cars. There is no mention made as to whether this price should apply to end doors made of wood or of iron, and it is therefore the opinion of the committee that the bill for end doors at $3 each applied, is correct and should be paid.

Mr. Rhodes being interested in this case, was not a party to this decision.

ARBITRATION CASE NO. 180.

WRONG DRAWBAR. CREDIT FOR ATTACHMENTS.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY COMPANY

versus

SOUTHERN PACIFIC COMPANY.

In November, 1892, the Chicago, Milwaukee & St. Paul Railway Company rendered a bill against the Southern Pacific Company, a portion of which was based upon Southern Pacific defect card attached to C. M. & St. P. R'y car 9310, calling for "one foreign cast stem drawbar complete," among other defects.

The S. P. Co. returns the bill to ascertain whether there were not some forgings removed with the foreign drawbar for which they should be allowed a credit at 4 cents per pound as per Rule 19. The C. M. & St. P. R'y Co. replies to this by saying that it does not allow such credits for wrought-iron forgings removed with foreign drawbars, as it is not required by the M. C.-B. Rules, but that Rule 19 refers to the material in the bar only. The S. P. Co. states that its understanding of the rule is, that the attachment should be credited at the value of the same when new as well as the bar, and that its view of the case is taken by other lines running into Chicago, which in rendering bills give full credit for the attachments as well as the bar. The C. M. & St. P. R'y Co. objects to doing this and says that it is not treated in that manner, and that none of its connections construes Rule 19 to refer to the attachments as well as the bar.

After further correspondence in the case without coming to a settlement, both parties agree to refer the case to the Arbitration Committee for decision.

DECISION.

Rule 19 reads: " Any company repairing foreign cars with wrong material and not in compliance with Rules 15, 16, 17 and 18 shall be liable for the cost of changing such car to the original standard or to the requirements of Rule 18. In case a foreign drawbar is removed from a car upon a defect card, a credit shall be allowed for the full value, new, of the material in the bar at the rates fixed in Rule 26." It must be clear that the credit at new value can only be applied to the drawbar.

It is the opinion of the committee that credit at full value new can only be claimed under the rules for the material in the bar itself and not for the attachments.

ARBITRATION CASE NO. 181.

CAR DESTROYED, RECENTLY REBUILT. SETTLEMENT FOR.

THE NEW YORK, CHICAGO & ST. LOUIS RAILROAD COMPANY

versus

THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY COMPANY.

The New York, Chicago & St. Louis Railroad Company rendered a bill against the Lake Shore & Michigan Southern Railway Company in March, 1893, for the value of body of N. Y. C. & St. L. R. R. car 11072, destroyed by the L. S. & M. S. R'y Co., less depreciation for 10 months, as follows:

Body	$240.00
Less 10 months' depreciation	12.00
	$228.00

The trucks to be returned in good order. The L. S. & M. S. R'y Co. objected to the bill on the ground that the car was not built new at so late a date as ten months prior to its destruction, and asks whether the date given is not the date the car was rebuilt, to which the N. Y. C. & St. L. R. R. Co. replied that they had the body of the car in question rebuilt by the United States Rolling Stock Company at the date given, stating that they used the old drawbars, but aside from that the car was almost new, and it therefore thinks the date should be when the car was rebuilt.

The Lake Shore states its willingness to make what would seem a fair and equitable settlement, but is not willing to pay more than the rebuilding cost. It calls attention to the decisions of the Arbitration Committee in cases Nos. 71 and 93, and asks to have a new bill rendered, figuring the depreciation from the time the car was built. To this the N. Y. C. & St. L. R. R. objects, stating that the car body in question was rebuilt by the U. S. R. S. Co. at a cost of $155 plus the castings, which were furnished by the railroad company, and adds that the car has a new body excepting the drawbars, which were old.

After further correspondence, in which they fail to settle the dispute, the matter is referred to the Arbitration Committee for decision.

DECISION.

Rule 23 clearly intends depreciation to begin at the date the car was built new, the clause limiting the depreciation to sixty per cent of the new value being inserted to cover general repairs and rebuilding. Rules cannot be framed to fit every case.

It is the opinion of the committee that the N. Y. C. & St. L.'s bill is not in accordance with the rules and should be corrected.

Mr. Mackenzie being interested in this case, was not a party to this decision.

ARBITRATION CASE NO. 182.

JOURNAL BEARINGS BURNED OUT. RESPONSIBILITY.

MISSOURI, KANSAS & TEXAS RAILWAY COMPANY
versus
OHIO & MISSISSIPPI RAILWAY COMPANY.

In July, 1892, the Ohio & Mississippi Railway Company rendered a bill against the Missouri, Kansas & Texas Railway Company for twenty-three journal bearings placed under seven M. K. & E. cars controlled by the M. K. & T. R'y Co., total amount of bill, $27.95.

The M. K. & T. Co. objects to the bill, and states that these cars were built new in the month of July and were only on the road two weeks, and that M. C.-B. Rule 8 does not apply to these cars, as the brasses were not worn out, and it asks to have the bill canceled.

The O. & M. R'y Co. states that the cars in question came to them at Flora from the west with a number of the brasses burned out, and that these are the same as those charged in the bill; that the cars could not have been moved without changing the brasses, and it does not understand why the M. K. & T. Co. refuses to pay the bill, when Rule 8 covers the work.

The M. K. & T. Co. states that Rule 8 reads, "Journal bearings worn out," and as the O. & M. Co. admits that these brasses were burned out, the rule does not apply, and that if they were not in condition to run, the O. & M. Co. had the right to refuse the cars when offered at Flora. The O. & M. Co. then refers to Arbitration Case No. 124, which it thinks is a parallel case, and sustains its action in rendering bill, but the M. K. & T. Co. does not agree that this is a parallel case, and refers to Arbitration Case No. 163 as a parallel case.

After failing to settle the matter, both parties request decision by the Arbitration Committee.

DECISION.

Rule 8 prescribes the conditions under which car owners shall be chargeable with journal bearings worn out. The O. & M. makes no claim that these bearings were worn out, but distinctly states that they were burned out, showing, however, that it was necesssry to have them removed at their receiving point, Flora, before the cars were safe to go over their line. The O. & M.'s protection in this case was to have exacted bad order cards from the line delivering the cars to it, or to have rejected the cars. Arbitration Case No. 124 cannot be regarded as a parallel case.

From the evidence submitted, it is clear that the M. K. & T. is in no way responsible for the damage to its cars. The O. & M. having failed to protect itself at its receiving point, cannot now collect from another railroad.

It is the opinion of the committee that the O. & M. bill should be canceled. See case 163.

ARBITRATION CASE NO. 183.

TRUCKS RETURNED FROM CAR DESTROYED. POINT OF DELIVERY.

GULF, COLORADO & SANTA FÉ RAILWAY COMPANY

versus

SOUTHERN PACIFIC COMPANY (ATLANTIC SYSTEM).

The Gulf, Colorado & Santa Fé Railway Company destroyed the body of M. L. & T. stock car 13034 and elected to return the trucks. Upon application for proper billing of these trucks, the G. C. & S. F. R'y Co. received instructions from J. J. Ryan, general master mechanic, Galveston, Harrisburg & San Antonio Railway Company and Texas & New Orleans Railroad Company, dated at Houston, Texas, to bill the trucks to P. J. Maguire, Algiers, Louisiana, charges prepaid to La Fayette, Louisiana, which is the nearest point on the line of the M. L. & T. R'y. The G. C. & S. F. R'y Co. billed the trucks to P. J. Maguire, Algiers, and delivered free to Houston, Texas, which is on the line of the S. P. Co., instead of La Fayette, Louisiana, as requested. This caused a dispute to arise, and the S. P. Co. claims that in accordance with Arbitration Case No. 96 the trucks should be delivered to La Fayette, Louisiana, which is the nearest point on the line of the M. L. & T. R'y.

The G. C. & S. F. R'y Co. claims that Arbitration Case No. 96 is not a parallel case; that the M. L. & T. R'y is only a portion of the S. P. Co. (Atlantic System) and that delivery of the car at Houston, Texas, constitutes a delivery in accordance with the requirements of the Rules of Interchange.

Both parties agree to refer the case to the Arbitration Committee.

DECISION.

The question in this case involves the ownership of M. L. & T. car 13034. It is a well-known fact that the M. L. & T. R. R. is one of the several roads making up the Atlantic System of the Southern Pacific Company, and can only be regarded as a portion of that system. It constitutes a branch running north from the main line at La Fayette. The fact that the settlement for the car was conducted from the office of the general master mechanic of the S. P. Co., at Houston, Texas, a point on the Atlantic System of the company west of La Fayette, and that the instructions were to ship the trucks to Algiers, a point on the Atlantic System east of La Fayette, and opposite New Orleans, and not to any point on the M. L. & T. R. R., must be regarded as confirming this view.

It is the opinion of the committee, from the foregoing considerations, that the S. P. Co. (Atlantic System) is the actual owner of M. L. & T. car 13034 from an operating standpoint, and in the sense intended by Rule 24, and that the delivery of the trucks free of charge at Houston, Texas, is all that can be demanded of the G. C. & S. F. R'y Co. under that rule.

ARBITRATION CASE NO. 184.

WRONG DRAWBAR. WEIGHTS CREDITED IN REPLACING.

LOUISVILLE, ST. LOUIS & TEXAS RAILWAY COMPANY

versus

BURLINGTON & MISSOURI RIVER RAILROAD IN NEBRASKA.

The Louisville, St. Louis & Texas Railway Company rendered a bill against the Burlington & Missouri River Railroad in Nebraska, in December, 1892, based upon a defect card issued by the B. & M. R. R. R. dated August 30, 1892, and attached to L. St. L. & T. car 2030, calling for "one wrong cast drawhead with yoke." The bill charges 220 pounds castings, and one hour labor, amount $4.60, and credits 100 pounds cast scrap at ¾ cent per pound and 15 pounds wrought scrap at 1 cent per pound, making the net amount of the bill, $3.70.

The B. & M. R. R. R. objects to the amount of material credited as scrap, and states that it does not use any kind of cast drawbar with yoke that has less than 150 pounds cast iron and 25 pounds wrought iron, and suggests that the weight of the material credited has been guessed at.

The L. St. L. & T. R'y states that the fact that the B. & M. R. R. R. does not use any lighter drawbars of this pattern than 150 pounds castings and 25 pounds wrought iron does not bear upon the case, because this bar may have been changed in the meantime without changing the card. It also states that the total weight of the bar and yoke removed was 115 pounds and that it credited 100 pounds of it as cast iron and 15 pounds as wrought iron. After further correspondence in the case and failure to settle the bill, the matter is referred to the Arbitration Committee by consent of both parties to the dispute.

DECISION.

The dispute in this case is wholly upon the correct weights of the scrap credited. It is the opinion of the committee that the statement of the owners of the car as to the amount of scrap removed when the wrong drawbar was replaced, must be accepted as correct. The defect card did not bear any evidence as to the weight of the wrong drawbar applied.

The bill, therefore, should be paid as rendered.

Mr. Rhodes being interested in this case, was not a party to this decision.

ARBITRATION CASE NO. 185.

DRAFT TIMBERS CARDED. CHARGE FOR BOLTS IN REPAIRING.

WHEELING & LAKE ERIE RAILWAY COMPANY

versus

CHESAPEAKE & OHIO RAILWAY COMPANY.

On January 31, 1893, the Wheeling & Lake Erie Railway Company rendered a bill against the Chesapeake & Ohio Railway Company, amount $3.44, based upon a defect card issued by the latter company in November, 1892, attached to W. & L. E. car 2254, calling for "two draft timbers damaged." The C. & O. R'y Co. objected to the bill because it contained a charge for 16 pounds of bolts, amount 64 cents, used in replacing the two damaged draft timbers. The W. & L. E. R'y claims that the charge of 64 cents is correct, and it cites Arbitration Cases 43 and 76 as covering the point in question. The C. & O. R'y in reply refers to Arbitration Case 132, which it claims is more recent and covers the case also. To this the W. & L. E. R'y argues that the circumstances in Case 132 were not parallel, while the circumstances in Cases 43 and 76 are parallel, and it further argues that if the defect card were issued to cover a certain number of pieces of siding damaged, a charge for nails and paint would be proper; also that if a defect card were issued covering a broken drawsill, a charge for timber in the sill as well as for nails, bolts, etc., to put the sill in place is proper, although the defect card calls for none of these included parts.

After further correspondence on the subject, both parties agree to submit the matter to the Arbitration Committee for decision.

DECISION.

The case above involves simply a question of charge for drawbar bolts, occasioned by replacing the two draft timbers damaged. Had the Chesapeake & Ohio Railway renewed the draft timbers per Rule 15, they might or might not have been able to use the old draft bolts in making good the repairs. It was more convenient to them to issue a defect card and thereby delegate the work to some other road. The parties doing the work state that they had to use new bolts. Arbitration Cases 43 and 76 are parallel cases, while Arbitration Case 132 is simply a question of wrong material that is not relevant.

It is the opinion of the Arbitration Committee that the bill, as rendered by the Wheeling & Lake Erie Railway Company, is in accordance with the rules and should be paid.

ARBITRATION CASE NO. 186.

DISPUTE AS TO INTENT OF CARD.

CHICAGO, BURLINGTON & NORTHERN RAILROAD COMPANY

versus

CINCINNATTI, NEW ORLEANS & TEXAS PACIFIC RAILWAY COMPANY.

On March 8, 1893, the Chicago, Burlington & Northern Railroad Company rendered a bill against the Cincinnati, New Orleans & Texas Pacific Railway Company, based upon a defect card issued by the latter company and attached to E. T. V. & G.

R'y car 12078, dated January 2, 1893, reading: "One attachment brake (or broke)." The bill charged for 64 pounds cast iron (two brake shoes); 16 feet of oak (one brake beam); 36 pounds wrought iron, consisting of one lever, two hangers and one jaw; and two hours' labor; total charge, $3.60.

The C. N. O. & T. P. R'y objected to the bill, stating that the card reads "one attachment broken," and claims that it refers to the drawbar attachment.

The C. B. & N. R. R. say that the card does not read "one attachment broken," nor does it mean "one attachment broke," but "one attachment, Brake," as evidenced by the capital letter *B*. It also states that the car was received by that company with the brake and attachments missing; that the same were applied and bill rendered on its positive knowledge that the material was furnished and the labor performed.

The C. N. O. & T. P. R'y brings no further arguments, but both parties agree to abide by the decision of the Arbitration Committee.

DECISION.

The committee finds on examining the card that the card reads: "One attachment, Brake," as the *a* in the word "brake" is made the same as the *a's* in the word "attachment," and in the signature, which has two *a's* in it; and it is, therefore, the opinion of the committee that the bill rendered by the C. B. & N. R. R. Co. on this card for the work actually done is in accordance with the Rules of Interchange, and should be paid.

JNO. W. CLOUD,
Secretary.

974 ROOKERY BUILDING.
CHICAGO, May 24, 1893.

CODE OF RULES

GOVERNING THE CONDITION OF, AND REPAIRS TO, FREIGHT CARS FOR THE INTERCHANGE OF TRAFFIC,

ADOPTED BY THE

MASTER CAR-BUILDERS' ASSOCIATION.

REVISED AT LAKEWOOD, N. Y., JUNE, 1893.

GENERAL.

Care of foreign cars.

RULE 1. Each railway company shall give to foreign cars, while on its line, the same care as to oiling and packing that it gives to its own cars.

DELIVERING AND RECEIVING CARS AT INTERCHANGE POINTS.

Condition of cars delivered.

RULE 2. Cars must be delivered in good running order, and returned in as good general condition as when received.

Defects for which cars may be refused.

RULE 3. Cars may be refused for any of the following defects:

DEFECTS OF WHEELS.

(*a*) Shelled out; wheels with defective treads on account of pieces shelling out, leaving flat spots deepest at the edge, with a raised center. Wheels must not be condemned from this cause, unless the spots are over 2½ inches or are so numerous as to endanger the safety of the wheel.

(*b*) Seams 1 inch long or over at a distance of ½ inch or less from the throat of the flange, or seams 3 or more inches long on any other point of the tread.

(*c*) Worn through chill; when the flat spot caused by wear exceeds 2½ inches in length. Care must be taken to distinguish this defect from flat spots caused by sliding wheels.

(*d*) Worn flange; flanges 1 inch thick or less, or having flat, vertical surfaces extending more than 1 inch from tread. (See Figures 3 and 4.)

(*e*) Tread worn hollow; if the tread is worn sufficiently hollow to render the flange or rim liable to breakage.

(*f*) Flat sliding; if the flat spots caused by sliding exceed 2½ inches in length. Care should be taken to distinguish this defect from *worn through chill.*

(*g*) Burst; if the wheel is cracked from the wheel fit, outward, by pressure from the axle.

(*h*) Broken or chipped flange; if the piece broken off exceeds 1½ inches in length and ½ inch in width, or if it extends ⅛ inch past center of flange.

(*i*) Broken or chipped rim; if the tread measured from the flange at a point ⅝ inch above tread, is less than 3¾ inches in width. (See Figure 5.)

(*j*) Cracked tread.

(*k*) Cracked plate.

(*l*) Cracked brackets.

(*m*) Broken in pieces.

Note.—The determination of flat spots, sharp flanges, thin flanges and chipped treads shall be made by a gauge of the following form:

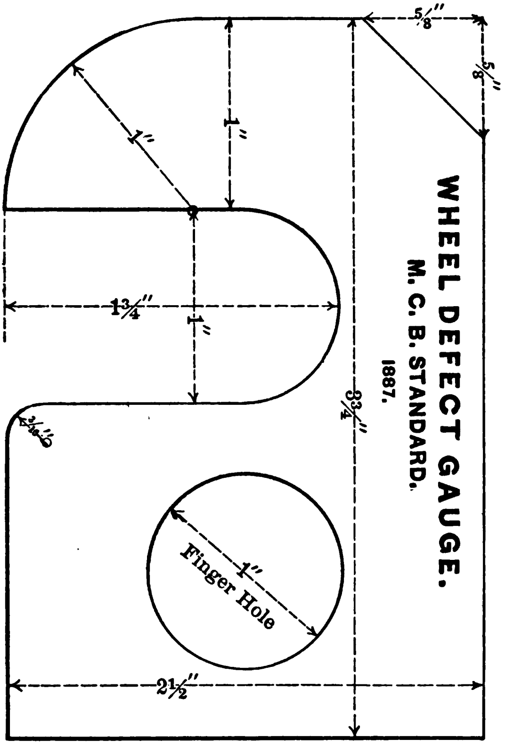
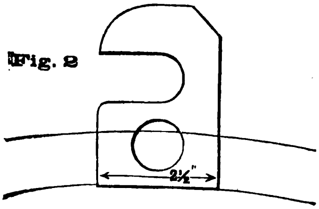


Fig. 1.

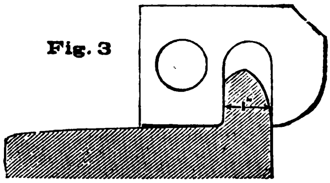
The following engravings of the wheel defect gauge, made on a reduced scale, show the method of using it.

Fig. 2



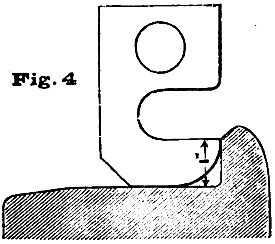
METHOD OF GAUGING FLAT SPOTS.
SEE (*a*) RULE 3.

Fig. 3



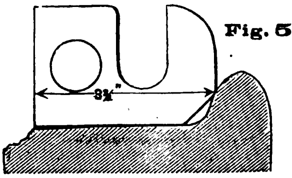
METHOD OF GAUGING THIN FLANGES.
SEE (*d*) RULE 3.

Fig. 4



METHOD OF GAUGING WORN FLANGES.
SEE (*d*) RULE 3.

Fig. 5



METHOD OF GAUGING CHIPPED RIMS.
SEE (*i*) RULE 3.

DEFECTS OF AXLES.

(*n*) Axles bent or broken.
(*o*) Journals cut.
(*p*) Axles less than the following limits:

Capacity of Car.	Journal.	Wheel Seat.	Center.
60,000	3¾ in.	5 in.	4⅜ in.
50,000	3½ "	4¾ "	4⅛ "
40,000	3¼ "	4⅝ "	3⅞ "
30,000	3 "		
20,000	2¾ "		

DEFECTS OF MOUNTING WHEELS ON AXLES.

(*q*) Loose wheel.

(*r*) Out of gauge, or wheels that measure less than 4 feet 5 inches or more than 4 feet 5¾ inches between flanges or less than 5 feet 4 inches over treads. (See Figure 6.)

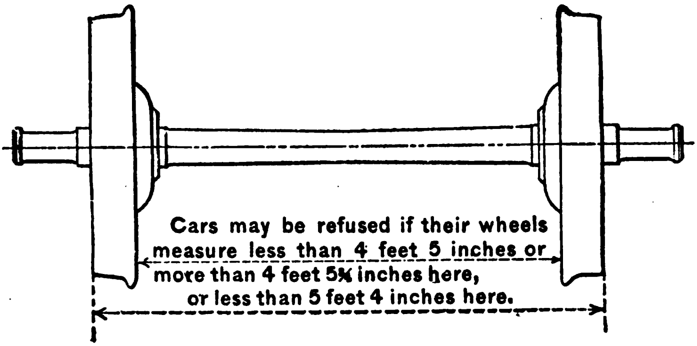

Cars may be refused if their wheels
measure less than 4 feet 5 inches or
more than 4 feet 5¾ inches here,
or less than 5 feet 4 inches here.

FIG. 6.

OTHER DEFECTS.

(*s*) Brakes in bad order.

Brakes shall be considered in bad order unless the following twenty-three conditions are complied with:

1. Brake wheel secured to the shaft with properly fitted nut.
2. Bottom of brake shaft secured by a nut or key, or some other suitable device to prevent shaft lifting out of position.
3. Brake chain secured to shaft with bolt, and bolt properly secured by nut or by rivet.
4. Upper brake shaft bearing properly secured to the end and top of box and stock cars by either two bolts or one bolt and one lag screw not less than one-half inch in diameter.
5. Brake ratchet wheel sound and well secured to shaft.
6. The brake pawl, when attached to brake step or to upper brake shaft bearing, secured with bolt and nut. When applied to roof of car, secured with either bolt or lag screw. The pawl sound and point effective.
7. Brake step secured by bolts in each of the two brackets. The brackets secured to car by either four bolts or four lag screws. The brake step sound at outer edges through both bolt holes.
8. Brake shaft step secured to car by either two or four bolts or lag screws. When the drawbar carry irons form the step, two bolts passing through draft-timbers should be effective.
9. Brake hangers secured to car body or trucks with full complement of bolts and nuts the hanger is drilled to receive, and also secured to brake head and beams in like manner. Brake beams, levers and attachments not less than 2½ inches from the top of the rail.
10. Brake heads in a condition to hold the shoes in place when applied.
11. Brake shoes secured to brake head by either key bolt, bolt and nut, or key, as required by form of head.
12. Brake shoes ⅜ inch thick or more at center.
13. Brake wheels must be free from any defect.
14. Brake beams sound, and when hung to body provided with guide irons.
15. Brake beam fulcrums (cast-iron) sound, and secured to brake beam by two bolts. Wrought-iron fulcrum firmly secured.
16. Brake connections properly secured to brake beam and to brake levers with key bolt and key.
17. If the car has air brakes, the cylinder must have been cleaned and the triple valve cleaned and oiled within twelve months, and the date of the last cleaning and oiling marked on the cylinder.

18. If the car has air brakes the cylinder must have been oiled within three months, and the date of the last oiling be marked on the cylinder.

19. If the car has air brakes, the brake shoe slack must be so adjusted that under the full application of the brakes, the piston travels not less than five inches nor more than nine inches.

20. If the car has air brakes, the brakes must apply and release promptly with proper handling by the engineer's valve.

21. Triple valves and auxiliary reservoirs must be free from water.

22. Air pipes and all connections thereto must be free from leaks, and the pipes properly secured to the car body so that injury shall not occur to the apparatus nor leaks be produced by shaking and vibration of the pipe.

23. If the car has air brakes, it must have two hose and couplings, in good order, which must be properly secured in the dummy couplings when not coupled to other cars.

(*t*) Steps, ladders, hand-holds or running boards in bad order or insecurely fastened.

(*u*) Drawbars and attachments in bad order.

Drawbars and attachments shall be considered in bad order unless the following ten conditions are complied with:

1. M. C.-B. couplers with such minor defects only as do not impair their efficiency and safety. The following defects will not be considered as impairing the efficiency or safety of M. C.-B. couplers.

A. Chipped to 1½ inches vertically, and 2½ inches horizontally from outer edge of guard arm, provided not less than five inches of metal is left intact on outer edge of guard arm at A. (See Figure 1.)

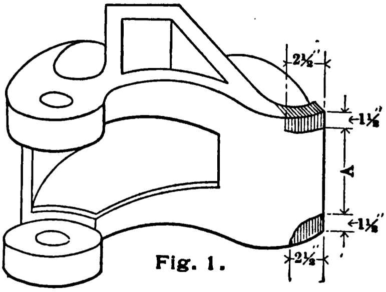


Fig. 1.

B. Chipped to 2½ inches vertically and one inch horizontally in center of guard arm, provided both top and bottom corners are perfect. (See Figure 2.)

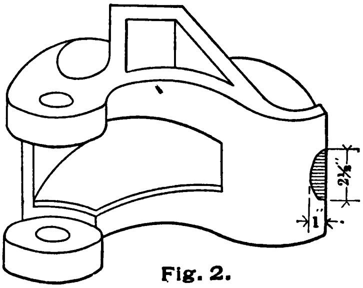


Fig. 2.

C. Chipped on side wall to three inches vertically and 1⅛ inches horizontally, as shown in Figure 3.

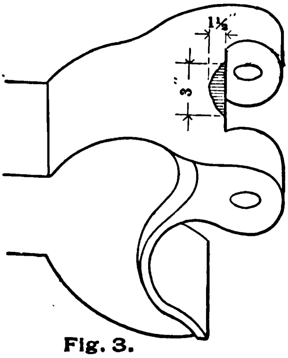


Fig. 3.

D. Chipped on front wall on center from face to three inches horizontally and ¾ inch vertically in top, bottom and throat, as shown in Figure 4.

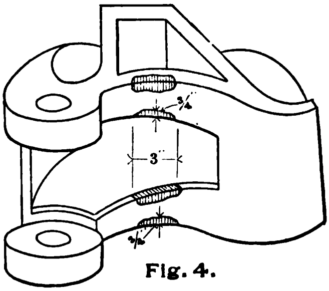


Fig. 4.

E. Chipped on lugs in which knuckle swings, to ½ inch vertically, ¾ inch back and three inches transversely, as shown in Figure 5.

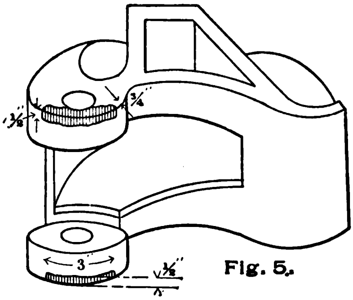


Fig. 5.

F. Having combination of chipped places within limits given above, as shown in Figures 6 and 7, provided that defects shown in Figures 1 and 2 do not together exist in the same coupler.

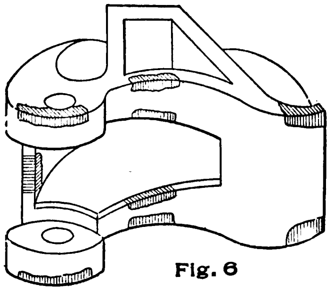


Fig. 6

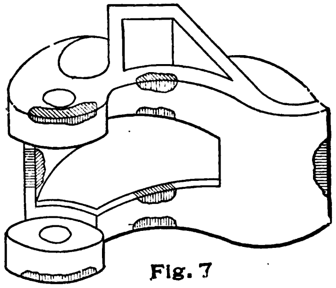


Fig. 7

G. Having rib in front of locking dog bent inward, provided rib is chipped off so as to allow dog to drop into position.

H. Knuckles with lugs chipped to ¾ inch vertically and ¾ inch horizontally at A, B, C and D. (See Figure 8.) These defects in knuckles are safe, but should be carded for.

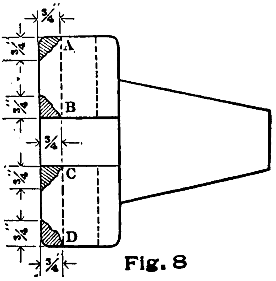


Fig. 8

2. M. C.-B. couplers must be equipped with a steel or a wrought-iron knuckle.

3. Where wrought-iron drawbars are used they must not be broken off outside of tenons, nor broken nor cracked in the opening of face-plate, nor in the angles of the pocket, nor through rivet holes nor must the filling be lost. Where cast-iron drawbars are used they must not be broken nor cracked through pin hole nor back of head, nor must bolts or rivets be missing where wrought pocket is used.

4. Drawbar stem, rod and bolt must be sound and secured back of drawbar follower plate by a nut or flat key. This to be secured by either a ring or spring cotter.

5. Drawbar stops must be sound, with all bolts and nuts in proper place.

6. Drawbar keys and followers must be sound, keys secured by cotter or ring, and followers held in proper place by drawbar guides.

7. Draft-springs composed of two or more coils must not have more broken parts than one inside coil.

8. Drawbar carrier irons should have two effective bolts on each side.

9. Draw-timbers must not be more than ⅜ inch down, and this only where bolts are effective.

10. Dead-blocks, wood sound, castings free from cracks through bolt holes and properly secured in place with bolts or rods.

(*v*) Center sills or draft timbers spliced.

(*w*) Intermediate or outside sill recently spliced in a manner not prescribed by the rules.

(*x*) Leaky roofs on merchandise or grain cars.

(*y-1*) Cars with doors missing; or in condition which will improperly protect the lading, or with door shoes worn or loose so as to allow the door to swing outwardly.

(*y-2*) Cars with four-hole center plates and long center pins through bolster, unless two of the bolts are effective.

(*y-3*) Cars with four-hole center plates and short center pins which rest in upper plate, unless three of the bolts are effective.

(*y-4*) Cars with two-hole center plates, unless both bolts are effective.

(*y-5*) Cars with two-hole center plates if center plate is broken.

(*z*) Special or general defects of bodies or trucks, which render cars unsafe to run.

Defect cards, use of.

RULE 4. A car with defects which do not render it unsafe to run or unsafe to trainmen must be accepted, but in such cases the company to which the car is offered may require that a defect card shall be securely attached to the car with four tacks, preferably on the outside face of the intermediate sill between the cross-tie timbers.

Duplicate cards shall be furnished for lost or illegible defect cards.

Defect cards, form of.

RULE 5. Defect cards shall be 3½ inches by 8 inches, and of the form shown below. They shall be printed on both sides and shall be filled in on both sides with ink or indelible pencil. The card must plainly specify in full each item for which charges are authorized:

M. C.-B. DEFECT CARD.

(*Name of Road.*)

Car No....................Date....................

Initial....................Line....................

Will be received at any point on this company's line, with the following defects:

NOTE.—Fill in defects on both sides with ink or indelible pencil. Attach this card with four tacks on outside face of intermediate sill, between cross-tie timbers.

....

....

....

..............Inspector at..............

Send bill on this card to

Making repairs noted by defect cards.

RULE 6. Any company finding a car with defect card attached may make the repairs noted by the card, provided such repairs are necessary for the safe running of the car, and render bill for same to the company attaching card, stating upon the bill the date and place when the repairs were made; the card to accompany the bill as voucher for the work done, but no bill shall be rendered for repairs which have not been made.

DEFECTS FOR WHICH OWNERS ARE RESPONSIBLE.

Locks and grain doors.

RULE 7. Locks and grain doors on cars are at owner's risk.

Roofs, brake shoes, journal bearings, bolsters, etc.

RULE 8. Car owners shall be chargeable with the repairs of their own cars when such repairs are necessitated by:

(*a*) Roofs lost from cars on account of decayed condition or faulty construction, and owners notified before the repairs are made.

(*b*) Brake shoes worn out, no charge to be made for labor of renewing.

(*c*) Journal bearings worn out, no charge to be made for labor of renewing, and an arbitrary scrap credit shall be allowed for one-half the weight of the bearing applied.

(*d*) Truck or body bolsters, or spring planks, or truck springs broken, provided that the car was not derailed or wrecked.

(*e*) Wheels and axles worn out as provided in Rule 9.

Wheels and axles.

RULE 9. When wheels or axles are renewed, they shall be treated as follows:

WHEELS.

Wheels charged to owners.

Wheels shall be charged to the company owning the car, if the cause of removal is:

(*a*) Shelled-out spots.

(*b*) Seams.

(*c*) Worn through chill.

(*d*) Worn flange.

(*e*) Tread worn hollow.

(*f*) Burst.

(*g*) Broken flange, if the breakage is caused by seams worn through chill or worn flange.

(*h*) Broken rim, if caused by rim being hollow.

(*i*) Cracked tread, if caused by being worn through chill.

(*j*) Cracked plate.

(*k*) Cracked brackets.

(*l*) Broke in pieces.

(*m*) Loose.

(*n*) Out of gauge.

Exceptions.

Wheels shall not be charged to the company owning the car, if the cause of removal is:

(*a*) Flat sliding.

(*b*) Chipped flange.

(*c*) Broken flange, if the breakage is not caused by seams, worn through chill or worn flange.

(*d*) Broken or chipped rim, not caused by rim being hollow.

(*e*) Breakage of any kind caused by derailment.

AXLES.

Axles charged to owners.

Axles shall be charged to the company owning the car if the cause of removal is:

(*a*) Wheels having defects which are chargeable to the owners.

(*b*) Axles bent or broken, or with collars worn off under fair usage.

(*c*) Axles less than the prescribed limits.

Exceptions.

Axles shall not be charged to the company owning the car if the cause of removal is:

(*a*) Wheels having defects for which the owner is not chargeable.

(*b*) Axles damaged by derailment or wreck.

(*c*) Cut journals.

When axles are renewed, the axles applied shall be stamped or prick-punched near the center with the initials of the road doing the work and the date of renewal.

Individual cars, repairs to.

RULE 10. In the case of cars belonging to private parties and corporations other than railway companies, or that are not cared for or controlled by a railroad company, the repairs or renewals of all parts that fail under fair usage, or on account of ordinary wear and tear, or bad or inferior design, may be made by railroad companies, and shall be paid for by the owners, except as already provided in Rule 8.

Home cards, use of.

RULE 11. A car unsafe to load on account of general worn-out condition, due to age or decay, shall be reported to its owner, who must be advised of all existing defects. If the owner elects to have it sent home, he shall furnish two home cards, noting upon them existing defects and the route over which the car is to be returned to its owner. If the route coincides with that over which the car passed to the point where it became unserviceable, no liability shall be incurred as between the owner and the road handling the car, either for freight charges in handling the car or for car service during this movement.

Such cards shall be attached to each side of the body of the car. They shall be 3½ by 8 inches, and of the form shown below. They shall be printed on both sides, and shall be filled in on both sides with ink or indelible pencil.

FROM

....R. R.

TO

....R. R.

VIA

....

....

To be shopped for..

....

....

....

(Head of Car Department.)

In case of private line cars, the cars shall be regularly billed home, and the owner notified.

BILLS FOR WHEEL AND AXLE WORK.

Wheels and axles, prices for.

RULE 12. Bills rendered for wheels and axles shall be in accordance with the following schedule of prices for material, with the proper debits and credits:

	NEW.	SECOND-HAND.	SCRAP.
One 36-inch wheel..................	$10 00	$7 00	$4 50
One 33-inch wheel..................	8 50	6 00	4 00
One 30-inch wheel (or less)..............	7 00	5 00	3 50
One axle, 60,000 lbs..................	10 00	6 00	4 00
One axle, 40,000 lbs. (or under)............	9 00	5 50	3 50

and with an additional charge of $1.50 for all labor for each pair of wheels and axle removed from the truck. If new wheels and axles are substituted for secondhand wheels and axles, proper charges and credits shall be allowed, although such substitution be made on account of only one loose or defective wheel or a defective axle, with the following exception: in case the owner of a car removes wheels on account of defective axle, the road responsible for damaging the axle shall not be charged for any difference in value between the wheels used and those removed.

Wheels and axles, form of bills.

RULE 13. Bills for wheel and axle work shall be in the following form:

……………………………………*Company,*

Address,……………………………………

To……………………………………*Railroad Company, Dr.*

For Wheels and Axles put under……………………*Cars, Month of*……………………*189*

Date and Place.	Initial, Kind and Number of Car.	Wheels and Axles Removed.					Wheels or Axles Applied.							Total Net Charge.
		Maker.	Date Cast.	No. on Wheel or Axle	Cause of Removal.	Shop Marks on Wheels and Axles.	Maker.	Date Cast.	No. on Wheel or Axle	New or Second Hand.	Shop Marks on Wheels and Axles.	Material. Net Charge.	Labor Charge.	

Date,……………………*189*　　*Received payment, $*……………………

……………………………………

Bills for wheel and axle work must make specific mention of each axle and wheel removed or applied.

Bills which do not embody all the information called for by the headings of the columns may be declined until made to conform to the requirements of the rule. If no marks are found on wheels or axles removed, a notation to that effect must be made on face of bill.

Wheels and axles, terms to be used in rendering bills.

RULE 14. In noting on bills the cause of removal of wheels and axles, the terms used in Rule 3, Sections *a* to *r*, shall be used, and the dimensions of the defect or variation from the prescribed limits should be carefully specified.

REPAIRING AND SETTLING FOR FOREIGN CARS.

Foreign cars damaged, repairing.

RULE 15. Foreign cars if damaged shall be promptly repaired by the company causing the damage; such repairs shall be thoroughly made and the work shall conform in detail to the original construction and with the same quality of material originally used, except as hereinafter provided; new standard parts may, however, be used if agreed to.

Use of M. C.-B. standards in repairs.

RULE 16. In repairing damaged cars M. C.-B. Standards may be used when of design and dimensions that do not mar or impair the strength of the cars, in lieu of the parts forming its original construction.

Any company finding a link and pin drawbar in a car originally equipped with a drawbar of the M. C.-B. type and so marked and carded for wrong material, may replace the link and pin drawbar with an M. C.-B. drawbar, and bill upon the card to the railroad company carding the car for the wrong drawbar.

When M. C.-B. couplers of another make are placed upon a car, the uncoupling arrangements shall be made operative, and when the attachments at the rear end of the coupler or the uncoupling arrangements are changed, a defect card shall be applied to the car for the wrong parts used in such attachments and uncoupling arrangements.

Precautions in mounting wheels.

RULE 17. Wheels on the same axle must be of the same circumference.

New wheels must not be mated with secondhand wheels.

Prick-punching or shimming the wheel fit must not be allowed.

Wheels applied must be marked on the inside with the date, the initials of the road doing the work and the place where the work is done.

The wheel seats of foreign axles must not be reduced more than $\frac{1}{16}$ inch to fit wheels.

Spliced sills.

RULE 18. All sills other than center sills to which draw timbers are attached may be spliced once. When the sills are less than twelve inches in width the plan shown in Figure 7 is to be followed:

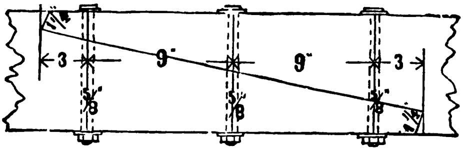


FIG. 7.

When the sills are 12 inches or more in width, the plan shown in Figure 8 is to be followed:

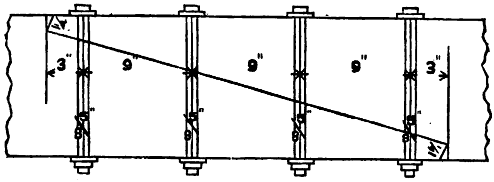


Fig. 8.

The splice may be located either side of body bolster, but the nearest point of any splice must not be within 12 inches of same. The splicing of two adjacent sills at the same end of the car or between cross-tie timbers will not be allowed.

Repairing cars with wrong material.

Rule 19. Any company repairing foreign cars with wrong material and not in compliance with Rules 15, 16, 17 and 18 shall be liable for the cost of changing such car to the original standard or to the requirements of Rule 18.

Cars originally equipped with link and pin couplers shall be accepted, provided drawbars fit properly and have sufficient strength and are in good condition; a card may, however, be required for any alterations which may have been made to rear end attachments.

Repairing cars with wrong materials, defect cards.

Rule 20. A company using wrong materials in such repairs shall place upon the car, at the time and place that the work is done, a defect card, except as provided in Rules 16 and 19, which defect card shall state the wrong material used and shall pass the car back to the owning road.

Foreign cars destroyed, repairing, etc.

Rule 21. The company on whose line the bodies or trucks are destroyed shall report the fact to the owner not later than 30 days after their destruction, and shall have its option whether to rebuild or settle for the same.

Foreign cars, rebuilding, manner of doing work.

Rule 22. If the company on whose lines the car is destroyed elects to rebuild, either body or trucks, or both, the original plan of construction must be followed, and the original kind and qualities of materials used. The rebuilding must be completed within 60 days from the original date of damage or destruction. In such cases no allowance shall be made for betterments.

Foreign cars destroyed, basis of settlement.

Rule 23. The settlement prices of new eight-wheel cars shall be as follows, with an addition of $40 for each car equipped with air brakes. The road destroying a car with air brakes may elect to return the air brake apparatus, including all attachments complete and in good condition.

BODIES.

Wood or Iron.

Box car, eight-wheel, 36 feet long or over	$325.00
Box car, eight-wheel, 34 feet long or over, but under 36 feet long	300.00
Box car, eight-wheel, 32 feet long or over, but under 34 feet long	275.00
Box car, eight-wheel, under 32 feet long	240 00
Stock car, eight-wheel, 34 feet long or over	300.00
Stock car, eight-wheel, 32 feet long or over, but under 34 feet long	275.00
Stock car, eight-wheel, under 32 feet long	240.00
Gondola car, eight-wheel, drop bottom, 20 tons or over	220.00
Gondola car, eight-wheel, drop-bottom, 15 tons or less	180.00
Gondola car, eight-wheel, hopper-bottom, 25 tons or over	275.00
Gondola car, eight-wheel, hopper-bottom, 20 tons or over	240.00
Gondola car, eight-wheel, hopper-bottom, 15 tons or over	200.00
Gondola car, eight-wheel, plain, 32 feet long or over	150.00
Gondola car, eight-wheel, plain, under 32 feet long	125.00
Flat car, eight-wheel, plain, 32 feet long or over	125.00
Flat car, eight-wheel, plain, under 32 feet long	100.00

NOTE.—The lengths of cars above mentioned refer to the lengths over all of the car bodies, except in the case of flat cars, in which case the lengths referred to are the lengths over end sills.

When cars of 60,000 pounds capacity or over have trucks with journals 4 inches or over in diameter when new, $25 per car shall be added to the figures as given above for the values of car bodies.

TRUCKS.

With wood transoms, one pair	$200.00
With metal transoms, one pair	250.00

FOUR-WHEEL CARS.

Coal car, ordinary, complete	$200.00
Box car, complete	230.00
Gondola car, drop-bottom, complete	300.00

Depreciation due to age shall be estimated at six per cent per annum upon the yearly depreciated value of the bodies and trucks only, provided, however, that allowances for depreciation shall in no case exceed sixty per cent of the value new. The amount, $40, for air brakes shall not be subject to any depreciation.

Refrigerator cars, special stock cars and other freight cars designed for special purposes, not specially referred to above, shall be settled for at the present cost price, as may be agreed to by the parties in interest, but the deduction for depreciation due to age shall be on the same basis as for regular freight equipment.

Foreign cars destroyed, returning trucks.

RULE 24. If only the body of a car is destroyed and the company destroying it elects to return the trucks, they shall be put in good order, or accompanied by a defect card, and delivered free of freight or other charges to the nearest point on the line of the company operating the car, and the number, line and class of car destroyed shall be stenciled or painted on each truck so returned.

FURNISHING MATERIAL AND BILLING WORK DONE.

Furnishing materials.

RULE 25. Companies shall promptly furnish to each other, upon requisition, and forward free over their own road, material for repairs of their cars injured upon foreign lines that cannot be procured in open market. Requisition for such material shall state that it is for repairs of cars, and shall give the number and lettering of such cars and pattern numbers of castings required when possible.

Bills for work done, basis.

RULE 26. Bills for work done on defect cards or for material furnished on requisition shall be on the basis of the following charges and credits:

MATERIAL.		CHARGE.	CREDIT.
Cast Iron	per lb.	$ .01 6-10	⅝c.
Malleable Iron	"	.03½	½
Bolts, Nuts and Forgings	"	.04	1
Steel Castings	"	.06	¾
Spring Steel (not Springs)	"	.05	¾
Brass and Phos. Bronze Journal Bearings	"	.13	9
Lumber: Yellow, White and Norway Pine, Poplar, Oak, Hickory and Elm	per ft.	.03	....
Labor	per hr.	.20	....
1 Box or Stock Car Side Door; applied		5.00	....
1 Box Car Ventilated Side Door, Wooden Frame with Iron Rods		8.00	....
1 Box or Stock Car Framed End Door		3.00	....
Chain	per lb.	.05	1
Air-Brake Hose and Coupling, complete; applied		2.00	....
1 M. C.-B. Drawbar with pocket Attachments, complete, with Locking Arrangements; applied		13.00	....
1 M. C.-B. Drawbar, with Tail Pin Attachments, complete, with Locking Arrangements; applied		12.50	....

Manufactured articles not included in above list, at current market prices without freight charges.

When M. C.-B. couplers are changed in Canada, on defect card acknowledging wrong material, the couplers may be charged at prices fixed in the Rules, plus the customs duty which must be paid on entering Canada.

No percentage to be added for either material or labor.

The following table shows the number of hours which may be charged for labor in doing the various items of work enumerated, which includes all work necessary to complete each item of repairs, except in so far as labor is already included in charges for materials:

	Refrigerator Cars.		All other Cars.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
1 side sill replaced	44	$8.80	38	$7.60
2 " sills "	65	13.00	53	10.60
1 " sill and 1 inter. sill replaced	60	12.00	44	8.80
1 " " " 2 " sills "	70	14 00	50	10.00
1 " " " 3 " " "	80	16.00	56	11.20
1 " " " 4 " " "	90	18.00	62	12.40
2 " sills " 1 " sill "	81	16.20	58	11.60
2 " " " 2 " sills "	91	18.20	64	12.80
2 " " " 3 " " "	101	20.20	70	14.00
2 " " " 4 " " "	111	22.20	76	15.20
1 center sill replaced	44	8.80	38	7.60
2 " sills "	65	13.00	53	10.60
1 side sill and 1 center sill replaced	65	13 00	53	10.60
1 " " " 2 " sills "	86	17.20	68	13.60
2 " sills " 1 " sill "	86	17.20	68	13.60
2 " " " 2 " sills "	107	21.40	83	16.60
1 intermediate sill replaced	40	8.00	29	5.80
2 " sills "	56	11.20	35	7.00
3 " " "	66	13.20	41	8.20
4 " " "	76	15.20	47	9.40
1 inter. sill and 1 center sill replaced	60	12.00	44	8.80
1 " " " 2 " sills "	81	16.20	58	11.60
2 " sills " 1 " sill "	70	14 00	50	10.00
2 " " " 2 " sills "	91	18.20	64	12.80
3 " " " 1 " sill "	80	16.00	56	11.20
3 " " " 2 " sills "	101	20.20	70	14.00
4 " " " 1 " sill "	90	18.00	62	12.20
4 " " " 2 " sills "	111	22.20	76	15.20
1 side, 1 inter. and 1 center sill replaced	81	16.20	58	11.60
2 " 1 " " 1 " " "	102	20.40	74	14.80
1 " 2 " " 1 " " "	91	18.20	64	12.80
2 " 2 " " 1 " " "	112	22.40	80	16.00
1 " 3 " " 1 " " "	101	20.20	70	14.00
2 " 3 " " 1 " " "	122	24.40	86	17.20
1 " 4 " " 1 " " "	111	22.20	76	15.20
2 " 4 " " 1 " " "	132	26.40	92	18.40
1 " 1 " " 2 " sills "	102	20.40	74	14.80
2 " 1 " " 2 " " "	123	24.60	89	17.80
1 " 2 " " 2 " " "	112	22.40	80	16.00
1 " 3 " " 2 " " "	122	24.40	86	17.20
1 " 4 " " 2 " " "	132	26 40	92	18.40
2 " 2 " " 2 " " "	133	26.60	95	19.00
2 " 3 " " 2 " " "	143	28.60	101	20.20
2 " 4 " " 2 " " "	153	30.60	107	21.40
1 side sill spliced	15	3.00	12	2.40
1 intermediate sill spliced	14	2.80	11	2.20
1 side plate, replaced	30	6.00	30	6.00
1 running board, replaced	6	1.20	6	1.20
1 end plate, replaced	14	2.80	14	2.80
1 " sill under siding, replaced	15	3.00	15	3.00
1 " " outside " "	7	1.40	7	1.40
1 end sill under siding, replaced when one or more defective sills have been replaced	3	.60	3	.60
1 end sill outside siding, replaced when one or more defective sills have been replaced	2	.40	2	.40
1 end or corner post, replaced	5	1.00	3	.60
1 door or side " "	5	1.00	3	.60
1 platform plank "	1	.20	1	.20
1 plain metal or wood body bolster, repl.	10	2.00	8	1.60
1 composite body bolster, replaced	12	2.40	10	2.00
1 plain metal or wood body bolster, replaced when one or more defective sills are replaced	2	.40	2	.40

	Refrigerator Cars		All other Cars.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
1 composite bolster, replaced when one or more defective sills are replaced	4	$ .80	4	$ .80
1 cross-tie timber, replaced	3	.60	3	.60
1 cross-tie timber, replaced when one or more defective sills are replaced	1	.20	1	.20
1 draft timber, replaced	6	1.20	6	1.20
1 draft timber, replaced when its center sill has been replaced	1	.20	1	.20
2 draft timbers on same end, replaced	10	2.00	10	2.00
1 carlin, replaced	..	....	2	.40
1 truck bolster, replaced	10	2.00	10	2.00
1 spring plank, "	10	2.00	10	2.00
1 truck bolster and 1 spring plank in same truck, replaced	12	2.40	12	2.40
1 brake beam, replaced	2	.40	2	.40
1 drawbar, "	2	.40	2	.40
1 M. C.-B. knuckle, replaced	½	.10	½	.10
Replacing center plates, 1 or 2 at one end	3	.60	3	.60
Replacing center-plate bolts in part or all at one end	3	.60	3	.60
Replacing draft-timber bolts complete at one end of car	3	.60	3	.60
Replacing deadwood at one end of car	2	.40	2	.40

MISCELLANEOUS.

Leased cars, treatment of in bills.

RULE 27. In rendering bills, cars shall be treated as belonging to railway companies whose name or initials they bear, except in the case of Line Cars, where the equipment list of the general officers of the Line designates a party to make settlement.

Cars destroyed on private sidings, settlements for.

RULE 28. For the mutual advantage of railway companies interested, the settlement for a car owned or controlled by a railway company, when damaged or destroyed upon a private track, shall be assumed by the railway company delivering the car upon such track.

Conditions of participation in Code of Rules.

RULE 29. Any railway company may become a party to this Code of Rules by giving notice through one of its general officers to the Secretary of the Master Car-Builders' Association.

Any railway company which is a party to this Code of Rules shall be bound by same through its successive revisions, until one of its general officers files with the Secretary of the Master Car-Builders' Association its notification of withdrawal.

Acceptance or rejection of this Code of Rules must be as a whole and no exception to an individual rule or rules shall be valid.

RULE 30. In order to settle disputes arising under the rules, and to facilitate the revision of the rules at the annual Conventions of the Association, an Arbitration Committee of five representative members shall be appointed annually by the Executive Committee; three members of this committee to constitute a quorum. The committee shall ask for suggestions of changes, amendments and additions to these rules prior to each annual Convention, which it shall consider, and it shall report its recommendations to the succeeding annual Convention.

In case of any dispute or question arising under the rules between the subscribers to said rules, the same may be submitted to this committee through the Secretary, who shall, before referring the case to the committee, notify both parties to the dispute to submit their reasons in support of their claims to the committee in order to enable it to decide intelligently. Should one of the parties refuse or fail to furnish the necessary information, the committee shall use its judgment as to whether, with the information furnished, it can properly give its opinion. The decisions of the committee shall be final and binding upon the parties concerned. This committee shall report its decisions to the Association, and their report shall be incorporated in the annual report of proceedings of the Association.

Rules, revision, basis of voting.

RULE 31. In the revision of these rules by the Association each railroad company shall be entitled to one vote for each full one thousand 8-wheel cars owned or in process of purchase in addition to the personal vote of its representative member. Two 4-wheel cars shall count as one 8-wheel car. A two-thirds vote shall be necessary for adoption.

Rules in effect Sept. 1, 1893.

RULE 32. This Code of Rules shall take effect September 1, 1893, and shall be introduced for discussion and revision at one session of the Master Car-Builders' Association Convention each year.

LIST OF RAILROAD COMPANIES

WHICH HAVE ADOPTED THE CODE OF RULES GOVERNING THE CONDITION OF, AND REPAIRS TO, FREIGHT CARS FOR THE INTERCHANGE OF TRAFFIC.

The following is a complete list of the railroad companies which have given notice of the adoption of the above Code of Rules.

Other railroad companies which adopt this Code of Rules should notify the Secretary in accordance with the Rules, so that the names of such companies may be included in the list thereafter. Notice should be given of all changes in the names of companies in this list.

Alabama Great Southern.
Alabama & Vicksburg.
Allegheny Valley.
Atchison, Topeka & Santa Fé.
Atlanta & Florida.
Atlantic & Pacific.
Atlanta & West Point.
Baltimore & Ohio.
Baltimore & Ohio South-Western.
Baltimore & Potomac.
Barberton Belt.
Beech Creek.
Boston & Albany.
Boston & Lowell.
Boston & Maine.
Boston, Hoosac Tunnel & Western.
Buffalo, Rochester & Pittsburgh.
Burlington, Cedar Rapids & Northern.
Burlington & Missouri River in Nebraska.
Cairo, Vincennes & Chicago.
Central Railroad of New Jersey.
Calumet & Blue Island.
Camden & Atlantic.
Canada Southern.
Canadian Pacific.
Cape Fear & Yadkin Valley.
Cape Girardeau South-Western.
Central R. R. & Banking Co. of Ga.
Central Vermont.
Champaign & Havana.
Chesapeake & Ohio.
Chesapeake & Ohio South-Western.
Chicago, Burlington & Kansas City.
Chicago, Burlington & Northern.
Chicago, Burlington & Quincy.
Chicago, Milwaukee & St. Paul.
Chicago, Peoria & St. Louis.
Chicago, Rock Island & Pacific.
Chicago, St. Louis & Pittsburgh.
Chicago, St. Louis & Western.
Chicago, St. Paul, Minneapolis & Omaha.
Chicago & Alton.
Chicago & Eastern Illinois.
Chicago & Erie.
Chicago & Grand Trunk.
Chicago & Iowa.
Chicago & Kenosha.
Chicago & North-Western.
Chicago & South Bend.
Chicago & South-Eastern.
Chicago & West Michigan.
Chicago & Western Indiana and Belt Railway.
Cincinnati, Hamilton & Dayton.
Cincinnati, Jackson & Mackinaw.
Cincinnati, Selma & Mobile.
Cincinnati, New Orleans & Texas Pacific.
Cleveland, Akron & Columbus.
Cleveland, Cincinnati, Chicago & St. Louis.
Cleveland & Marietta.
Cleveland, Canton & Southern.
Clove Branch.
Colorado Midland.
Columbus, Hocking Valley & Toledo.
Connecticut River.
Cornwall & Lebanon.

Cumberland Valley.
Delaware, Lackawanna & Western.
Delaware & Hudson Canal Co.
Denver & Rio Grande.
Detroit, Grand Haven & Milwaukee.
Detroit, Lansing & Northern.
Des Moines & Fort Dodge.
Des Moines & Northern.
Duluth & Iron Range.
Duluth, South Shore & Atlantic.
Durham & Northern.
East Tennessee, Virginia & Georgia.
Fall Brook.
Fitchburg.
Flint & Pere Marquette.
Florida Central & Peninsular.
Geneva, Ithaca & Sayre.
Georgia.
Georgia, Carolina & Northern.
Georgia Southern & Florida.
Grand Trunk & Great Western Division.
Grand Rapids & Indiana.
Gulf, Colorado & Santa Fé.
Hannibal & St. Joseph.
Hartford & Connecticut Western.
Housatonic.
Houston & Texas Central.
Huntington & Broad Top Mountain.
Illinois Central.
Indiana, Bloomington & Western.
Indianapolis, Decatur & Western.
Intercolonial of Canada.
International & Great Northern.
Iowa Central.
Iowa, Indiana & Illinois.
Jacksonville, St. Augustine & Indian River.
Jacksonville, Tampa & Key West.
Joilet & Blue Island.
Kanawha & Michigan.
Kansas City, Fort Scott & Memphis.
Kansas City, St. Joseph & Council Bluffs.
Kentucky Union.
Keokuk & Western.
Lake Champlain & Moriah.
Lake Erie & Western.
Lake Shore & Michigan Southern.
Lehigh Valley.
Litchfield, Carrollton & Western.
Louisville, Evansville & St. Louis.
Louisville, New Albany & Chicago.
Louisville & Nashville.
Louisville, New Orleans & Texas.
Louisville, St. Louis & Texas.
Louisville & St. Louis.
Mahoning Valley.
Maine Central.
Manitoba & North-Western Railway of Canada.
Mason City & Fort Dodge.
Mexican Central.
Michigan Central.
Milwaukee, Bay View & Chicago.
Milwaukee, Lake Shore & Western.
Minneapolis, St. Paul & Sault Ste. Marie.
Minneapolis & St. Louis.
Minnesota & North-Western.
Missouri, Kansas & Texas.
Missouri Pacific.
Montana Union.
Mobile & Ohio.
Nashville, Chattanooga & St. Louis.
Newburgh, Dutchess & Connecticut.
New Orleans and North-Eastern.
Newport News & Mississippi Valley.
New York Central & Hudson River.
New York & Northern.
New York, Chicago & St. Louis.
New York, Lake Erie & Western.
New York, New Haven & Hartford.
New York, Ontario & Western.
New York, Pennsylvania & Ohio.
New York, Providence & Boston.
New York, West Shore & Buffalo.
New York & New England.
New York Susquehanna & Western.
Norfolk Southern.
Norfolk & Carolina.
Norfolk & Western.
Northern Central.
Northern Pacific.
Old Colony.
Ohio & Mississippi.
Ohio Southern.

Ogdensburg & Lake Champlain.
Pennsylvania Company.
Pennsylvania Railroad.
Pennsylvania, Poughkeepsie & Boston.
Peoria, Decatur & Evansville.
Petersburg.
Philadelphia & Reading.
Philadelphia, Wilmington & Baltimore.
Pittsburgh, Chartiers & Youghiogheny.
Pittsburgh, Cincinnati, Chicago & St. Louis.
Pittsburgh & Lake Erie.
Pittsburgh & Western.
Providence & Worcester.
Raleigh & Augusta Air Line.
Raleigh & Gaston.
Richmond, Fredericksburg & Potomac.
Richmond & Danville.
Rome, Watertown & Ogdensburg.
Roanoake & Tar River.
St. Paul & Duluth.
St. Joseph & Grand Island.
Saginaw Valley & St. Louis.
Scioto Valley.
Seaboard & Roanoake.
Shenandoah Valley.
Shenango & Allegheny.
Sioux City & Northern.
South Atlantic & Ohio.
South Carolina.
South Florida.
Southern Central.
Southern Pacific (Pacific System).
St. Louis, Keokuk & North-Western.
St. Louis & San Francisco.
St. Louis South-Western.
St. Louis South-Western Railway of Texas.
Staten Island Rapid Transit.
Terre Haute & Indianapolis.
Texas Pacific.
Toledo, Cincinnati & St. Louis.
Toledo, Columbus & Cincinnati.
Toledo, St. Louis & Kansas City.
Toledo & Ohio Central.
Toledo & Ohio Central Extension.
Toronto, Grey & Bruce.
Troy & Boston.
Tyler South-Eastern Railway.
Union Pacific.
Valley Railway.
Vicksburg & Meriden.
Vicksburg, Shreveport & Pacific.
Virginia Midland.
Wabash Railway.
Washington Southern.
Wheeling & Lake Erie.
Western Maryland.
Western Railway of Alabama.
Western New York & Pennsylvania.
West Jersey.
Wilmington, Columbia & Augusta.
Wilmington & Northern.
Wilmington & Weldon.
Wisconsin Central.
Zanesville & Ohio River.

APPENDIX.

CODE OF RULES GOVERNING THE CONDITION OF, AND REPAIRS TO, PASSENGER EQUIPMENT CARS IN INTERCHANGE.

1. Each railway company shall give to foreign cars, while on its line, the same care and attention that it gives its own cars, except in case of cars on which work is done under special agreement existing between the company owning the cars and the road operating the same.

2. Cars must be delivered in good running order, and returned in as good general condition as when received.

3. The receiving road is authorized to make such alterations and repairs as are necessary for the safe movement of cars over its line, and must immediately notify the delivering road of all such alterations and repairs, upon receipt of which notification the delivering road shall furnish proper authority to render bill for such alterations and repairs.

4. Authority must be furnished for the replacement of wheels and axles if in the following condition:

WHEELS.

(*a*) Loose wheels.

(*b*) Variation from gauge as indicated by Figure 1. (See page 40.)

WHEELS, CAST-IRON.

(*a*) Shelled out, with treads defective on account of circular pieces shelling out, leaving round, flat spots, deepest at the edges, with raised centers, if 1¼ inches or more in diameter.

(*b*) Tread worn hollow; if tread is worn sufficiently hollow to render flange or rim liable to breakage.

(*c*) Worn flange; flanges having flat, vertical surfaces, extending more than ¾ inch from tread.

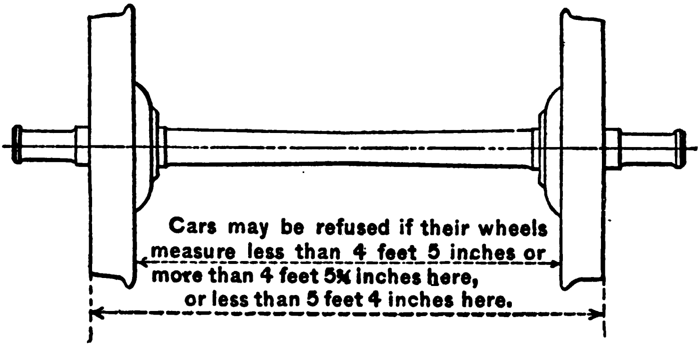

Cars may be refused if their wheels measure less than 4 feet 5 inches or more than 4 feet 5¾ inches here,
or less than 5 feet 4 inches here.

FIG. 1.

(*d*) Flat spots; if flat spots, caused by sliding, exceed 1¼ inches in length.

(*e*) Burst; if wheels are cracked from the wheel-fit outward by pressure from the axle.

(*f*) Flanges, rim, tread, plate or brackets, either cracked, chipped or broken in any manner.

WHEELS, STEEL-TIRED.

(*a*) Loose, broken or cracked hubs, plates, bolts, retaining ring or tire.

(*b*) Worn flange or tire; with flanges less than ¾ inch thick, or having flat, vertical surfaces extending more than ¾ inch from tread, or with tire less than 1 inch in thickness.

(*c*) Flat spots; if flat spots, caused by sliding, exceed 1¼ inches in length.

AXLES.

Axles bent or broken, or having journals cut, or less than 3½ inches in diameter.

5. Brakes must be in perfect working order (adjustment based on seventy pounds as the initial pressure), with a piston travel of not less than 5 inches, nor more than 8 inches.

6. Bills for wheels and axles shall be of the following form, and must make specific mention of each wheel and axle removed or applied:

..Company,

Address,..

To..Railroad Company, Dr.

For Wheels and Axles put under..........................Cars, Month of..........................189

Date and Place.	Initial, Kind and Number of Car.	Wheels and Axles Removed.					Wheels or Axles Applied.							
		Maker.	Date Cast.	No. on Wheel or Axle	Cause of Removal.	Shop Marks on Wheels and Axles.	Maker.	Date Cast.	No. on Wheel or Axle	New or Second Hand.	Shop Marks on Wheels and Axles.	Material. Net Charge.	Labor Charge.	Total Net Charge.

Date,..........................189

Received payment, $..........................

....

7. Bills rendered for labor and material furnished shall be in accordance with the following prices, with the proper debits and credits:

	NEW.	SECONDHAND.	SCRAP.
1 36-inch Cast Wheel	$11.00	$8.00	$5.00
1 33-inch Cast Wheel	9.00	6.50	4.50
1 axle, 60,000 lbs	10.00	6.00	4.00
1 axle, 40,000 lbs	9.00	5.50	3.50

	NEW.	CREDIT FOR SCRAP.
Journal Bearings	15 cents.	9 cents.
Malleable Iron	3½ "	½ "
Bolts, Nuts, Wrought Washers and all Wrought Iron except Axles	4 "	1 "
Castings	1 6-10 "	⅝ "
Spring Steel (not Springs)	5 "	¾ "
Lumber—Oak, Pine, Poplar, Hickory and Elm	3	
Labor	25c. per hour.	

All steel castings and steel wheels of the different makes to be charged at current market prices.

Removing, turning and replacing a pair of steel-tired wheels, $7.

Removing and replacing a pair of cast-iron wheels, $2.

Loss of service metal from steel-tired wheels as a result of slid spots or other causes, to be charged at the rate of $2 per $\frac{1}{16}$ inch thickness of tire.

Glass, paints and other materials to be charged at current market prices.

LIST OF RAILROAD COMPANIES.

The following is a complete list of the railroad companies which have given notice of the adoption of the Code of Rules for the interchange of passenger equipment cars:

Atlanta & Florida.
Baltimore & Ohio.
Cairo, Vincennes & Chicago.
Cape Fear & Yadkin Valley.
Chesapeake & Ohio.
Chicago & Erie.
Chicago & Grand Trunk.
Chicago & North-Western.
Chicago, Burlington & Kansas City.
Chicago, Burlington & Quincy.
Cincinnati, Hamilton & Dayton.
Cincinnati, Saginaw & Mackinaw.
Cleveland, Cincinnati, Chicago & St. Louis.
Cornwall & Lebanon.
Denver & Rio Grande.
Detroit, Grand Haven & Milwaukee.
East Tennessee, Virginia & Georgia.
Fitchburg.
Florida Central & Peninsular.
Grand Rapids & Indiana.
Grand Trunk (Michigan Div.).
Hannibal & St. Joseph.
Jacksonville, Tampa & Key West.
Jacksonville, St. Augustine & Indian River.
Kanawha & Michigan.
Kansas City, St. Joseph & Council Bluffs.

Lake Shore and Michigan Southern.
Manitoba & North-Western Railway of Canada.
Mason City & Fort Dodge.
Missouri Pacific.
Nashville, Chattanooga & St. Louis.
New York, Lake Erie & Western.
Northern Pacific.
Pennsylvania, Poughkeepsie & Boston.
Pittsburgh & Western.
Sioux City & Northern.
South Florida.
Southern Pacific Company.
St. Louis, Iron Mountain & Southern.
St. Louis, Keokuk & North-Western.
St. Louis South-Western.
St. Louis South-Western of Texas.
Toledo & Ohio Central.
Toledo & Ohio Central Extension.
Toledo, Saginaw & Muskegon.
Tyler South-Eastern.
Union Pacific.
Wabash.

MINUTES OF MEETINGS OF THE EXECUTIVE COMMITTEE.

MINUTES OF MEETING OF THE EXECUTIVE COMMITTEE OF THE MASTER CAR-BUILDERS' ASSOCIATION, HELD AT LAKEWOOD, N. Y., JUNE 12, 1893.

Members present: Messrs. Grieves, Rhodes, Lentz, Chamberlain, Barber, Demarest, Leeds and Blackall.

The Secretary submitted items of expenses incurred since the last meeting of the Executive Committee, as follows:

By paid,	Expressage	$2.53
"	Electros	72.61
"	Exchange	4.10
"	Expenses of Arbitration Committee	43.10
"	Printing	452.05
"	R. W. Ryan, Transcript of Proceedings	3.12
"	Stationery and Supplies	6.95
"	Stamped Envelopes and Stamps	91.60
"	Secretary's Salary	1,500.00
"	Telegrams	10.81
"	Tracing and Blue Prints	48.50
	Total	$2,235.37

which taken with the amount authorized at the last meeting of the Executive Committee, $4,001.03, makes a total expenditure for the year of $6,236.40.

The Secretary's Report was then presented to the committee showing,

Total Receipts	$7,423.35
" Expenditures	6,236.40
Balance, remitted to the Treasurer	$1,186.95

This report was ordered read in the Convention.

The Treasurer's report was also read, showing that the total amount in the Treasurer's hands since the receipt of the $1,186.95 from the Secretary, was $5,452.96, which report was also ordered to be read in Convention, and the Treasurer, on request for authority to keep the funds of the Association in some specific bank, was instructed to keep them in the First National Bank of Baltimore until further instructed.

Invitations from New York, Lake Erie & Western R. R. Co. and the Western New York & Pennsylvania R. R. Co. to an excursion during the Convention were read and ordered to be presented to the Convention for action.

A letter from Mr. W. W. Lobdell, of the Wheel Manufacturers' Association, to E. W. Grieves, President of the Master Car-Builders' Association, was read, and upon motion was laid upon the table.

A letter from Mr. A. M. Waitt, General Master Car-Builder of the Lake Shore & Michigan Southern R'y, about the location of dummy couplings for air brakes, was read and ordered presented to the Convention with the recommendation that a committee be appointed to report to this Convention upon the advisability of modifying the standard location.

A letter from Mr. C. F. Street, Secretary of the Western Railway Club, on Wheel Flanges and Track Gauges, was read, and it was decided that a committee should be appointed for next year to report upon this subject, and to confer with similar committees from other Associations if such be appointed.

The reports of committees were then considered and ordered to be read in Convention, with the stipulation that the lid shown on the drawing of standard journal boxes submitted by one of the committees should be so modified as to enable it to be made of malleable iron as well as of pressed steel.

In regard to the report of the Committee on Air Brake Tests, the Chairman, Mr. G. W. Rhodes, stated that he had received 50 complete sets of air brakes and 50 sets minus the triple valves from the Westinghouse Air Brake Co., and he would like the Executive Committee to decide how the material should be treated; that the Westinghouse Air Brake Co. had offered to give the material to the Association, or to loan it as long as it saw fit to use it. The Executive Committee decided to accept the loan of the material as long as needed.

It was further decided to recommend to the Convention that the dues for the ensuing year should be $5.00 per vote.

The meeting then adjourned.

MINUTES OF MEETING OF THE EXECUTIVE COMMITTEE OF THE MASTER CAR-BUILDERS' ASSOCIATION, HELD AT LAKEWOOD, N. Y., JUNE 16, 1893.

The newly elected Executive Committee held a meeting on June 16, at which the following members were present:

Messrs. Grieves, Rhodes, Crone, Bissell, Chamberlain, Barber, Demarest, Blackall and Lentz.

The Committee proceeded to elect a Secretary, which resulted in the election of John W. Cloud Secretary for the ensuing year at a salary the same as heretofore.

The Arbitration Committee was appointed, consisting of G. W. Rhodes, Chairman; J. W. Marden, John Mackenzie, M. M. Martin and G. L. Potter.

It was decided to fix the price of M. C.-B. drawbars in the Rules of Interchange as per instructions of the Convention: 1 M. C.-B. drawbar with pocket attachments, complete, with locking arrangements; applied, $13.00.

1 M. C.-B. drawbar with tail-pin attachments, complete, with locking arrangements; applied, $12.50.

As no action was taken by the Convention on the invitation of the Western New York & Pennsylvania R. R. Co. to an excursion, the Secretary was instructed to answer that letter stating just why no action could be taken, because it required consultation with the Master Mechanics' Association, and that their Executive Committee had not been present.

The matter of tests of metal for brake shoes was then considered, and a Committee on Laboratory Tests was appointed, as follows:

Mr. S. P. Bush, chairman; D. L. Barnes, J. W. Cloud.

A committee on Road Tests of Brake Shoes was appointed, consisting of Messrs. Soule, Morris, Mitchell, Crone, Rhodes, Lewis, Marden, Waitt, Townsend, Porcher, Barber and Hoffecker. The first three named to be an acting committee, with Mr. Soule as chairman of same.

The Committee then considered the action of the Supply Men on their entertainment for the Convention, and instructed the Secretary to write to the Chairman of that Committee, the letter to be signed by all members of the Executive Committee by unanimous vote, calling their attention to the wish of the Association as printed under "Entertainments," at the end of the Standards, and request that more attention be paid to it, as follows:

"LAKEWOOD, N. Y., June 16, 1893.

"*T. R. Freeman, Esq., Chairman :*

"DEAR SIR,—At a session of the newly elected Executive Committee of the Master Car-Builders' Association, held here today, it was resolved by the unanimous vote of that Committee that the attention of your Committee on Entertainment should be called to the wish of the Association, as expressed in the Article under the head of Entertainments, printed annually with the standards of the Association, as follows:

" 'WHEREAS, the practice of entertaining the members of this Association by its friends has become an established custom, and has thus assumed somewhat the character of an obligation to which those who have so generously dispensed hospitality have, in a measure, felt themselves obliged to conform; and

" 'WHEREAS, the expenditure of time and money for this purpose has in many cases been very much greater than the members of this Association have a right to expect should be devoted to their enjoyment; and

" 'WHEREAS, the expense of such hospitality has in some cases been interpreted as having a significance which has been the cause of embarassment to its members;

" 'THEREFORE, we desire by this Resolution, first, to express our thanks for the liberality of our friends in the past; and, secondly, to make the request in this public way that in the future there shall be no more expenditure of money for the public entertainment of members of this Association.'

"The Preamble and Resolution were unanimously adopted.

"The action taken at the present time is taken because at each successive Convention held during the past few years an increased expenditure by your Committee has been noticeable.

"Yours truly,

"E. W. GRIEVES,	J. S. LENTZ,	S. A. CRONE,
T. A. BISSELL,	G. W. DEMAREST,	J. T. CHAMBERLAIN,
G. W. RHODES,	PULASKI LEEDS,	R. C. BLACKALL,
J. C. BARBER,	J. M. WALLIS,	

"*Executive Committee,*
By Jno. W. Cloud,
Secretary."

The meeting then adjourned.

CIRCULAR RELATING TO LETTER BALLOTS.

To the Members of the Master Car-Builders' Association :

During the sessions of the Convention of the Master Car-Builders' Association, held at Lakewood, New York, in June, 1893, it was decided to submit recommendations for standards to letter ballot as follows :

STANDARDS OF THE ASSOCIATION.

The report of the Committee of 1892 on Standards of the Association, which was read at the Convention of 1892 and printed in the Proceedings, and which was made an order of business at the Convention of 1893, with some sub-committees to report upon details, advised as follows :

"In view of the facts which have been recited, the committee is ready to advise that the following standards should be rescinded and abolished :

(*Referring to the Proceedings of 1891.*)

Page 235, figure 3	Diameter Testing Gauge.
Page 235, figure 4	Flange and Journal Gauge.
Page 235, figure 5	Wheel Bore Testing Gauge.
Page 237, figure 7	Journal Length and Diameter Gauge.
Page 237, figure 8	Guard Rail Gauge.
Page 237, figure 9	Centering and Journal Shoulder Gauge.
Page 237, figure 10	Journal Distance Gauge.
Page 238	Boring Wheels (the use of six dogs).
Page 245	Attachments and Dimensions of Drawbars.
Page 248	Train Pipe Fitting for Steam Heat.

"It is proposed to retain the wheel circumference measure as a standard, but it is believed that the form of gauges to be used to produce certain standard dimensions in standard parts is purely a matter of local shop practice which should not properly be legislated upon by the Association. Similarly with the question of chuck-jaws or dogs for centering wheels on the table of a wheel-boring machine. The standards governing the attachments and dimensions of drawbars are very old (established in 1876 and 1879), and do not command any respect at the present time; are but seldom observed or conformed to, and have been in part superseded by the present standards governing the proportions of vertical plane couplers. The standard train pipe fitting for steam heat is practically a dead letter, which is our justification for recommending its abolishment.

"The present standards of the Master Car-Builders' Association are the result of their deliberations through a long period of years. Many of the earlier standards were adopted when the Association was in its infancy, and there has been a great deal of legislation under the general heading of standards, which has resulted in the acceptance and promulgation of certain forms of construction or forms of practice, which, in our judgment, ought never to have been classified as standards. It is the opinion of the committee, therefore, that what are now comprehended under the general category of standards of the Association should be divided into two groups; the first group to be continued and maintained as the standards of the Association; the other group to be rescinded as standards, but to be established as recommended practice; these two groups of subjects may be defined as follows:

STANDARDS.

"Those forms, parts, constructions, units, measurements or systems in which it is desirable to secure not only sound construction, good practice, and safe operation, but which also promote quick and cheap repairs and consequent free interchange of cars.

RECOMMENDED PRACTICE.

"Those forms, parts, constructions, units, measurements or systems which are conducive of sound construction, good practice, and safe operation, but which do not affect either interchangeability of parts or interchangeability of cars as a whole.

"The present standards of the Association would naturally group themselves under these revised headings, as follows:

STANDARDS.

WHEELS AND AXLES.

Section of Wheel Tread and Flange.
Wheel Circumference Measure.
Axles.
Gauge for Mounting Wheels.

JOURNAL BOXES AND CONTAINED PARTS.

Journal Boxes.
Journal Box Lids.
Journal Bearings and Wedges.

DRAW GEAR.

Vertical Plane Couplers.
Height of Drawbar.

BRAKE GEAR.

Brake Shoe and Head.
Iron Brake Beam.
Angle of Brake Lever.
Train Pipe Pressure (for Air Brake).
General Arrangement of Brake Levers (for Air Brake).
Details, of Rods, Levers, etc. (for Air Brake).
Location of Dummy Couplings (for Air Brake).
Percentage of Light Weight Braked (for Air Brake).

MISCELLANEOUS.

Passenger Truck Pedestal.
Screw Threads.

RECOMMENDED PRACTICE.

Diameter of Chill Moulds.
Specifications for Cast-Iron Wheels.
Guarantee for Cast-Iron Wheels.
Protection of Trainmen.
Dead Blocks.
Platform Safe Chains.
Truck Check Chains.
Capacity of Draw Springs.
Limit Gauges for Round Iron.
Loading Logs, Poles and Bark on Cars.
Marking Cars.
Lettering and Numbering Fast Freight Line Cars.

"It is believed that the following, which are now classified under the head of standards, do not properly belong either under the proposed classification of standards or of recommended practice:

Storage of Line Cars on Foreign Roads.
Dictionary of Terms.
Entertainments.

"The information embodied under these three headings should, of course, be properly recorded, and should be reprinted in the Proceedings from year to year.

"It is believed that this limitation of the word 'standard' would inspire respect, and would result in the more general observance of standards than now.

"The committee offer the following suggestions in reference to the present standards if subdivided and grouped separately as standards and as recommended practice:

STANDARDS.

Section of Wheel Tread and Flange: (Believed to be all right.)

Wheel Circumference Measure: (Believed to be all right.)

Axle: (The committee is of the opinion that it would be expedient to submit to a special committee appointed for the purpose, the question of modifying the present light axle so as to make its journal 4 by 7 inches instead of 3¾ by 7 inches as now.)

Gauge for Mounting Wheels: (Believed to be all right.)

Journal Boxes: (It is suggested that the drawings of the present standard journal boxes, if reproduced full size, should be very carefully revised, as there are evidences that the present drawings are not complete in every respect.)

Journal Box Lids: (The drawings should be revised together with the drawings of the journal boxes.)

Journal Bearings and Wedges: (The designs for these parts also need to be carefully re-dimensioned.)

Vertical Plane Couplers: (Believed to be all right.)

Height of Drawbars: (The indications are that standard height of 33 inches for freight equipment cars has not been adhered to, and that there is a tendency to increase this height. It would, therefore, seem well to have the facts reviewed by a special committee who should advise whether it was expedient to modify the standard height of drawbars for freight equipment cars.)

Brake Shoe and Head: (Believed to be all right.)

Iron Brake Beam: (Plate XII now shows the Westinghouse iron brake beam in detail. It is suggested that the drawing should be revised to simply show the center lines of a triangular brake beam, without showing any specific construction of brake beam, but distinctly showing the Christie brake head and shoe in position; the distance from center to center of brake heads; the location of brake beam strut; the angle of the brake lever which passes through the strut, etc., etc.)

Angle of the Brake Lever: (Believed to be all right.)

Train Pipe Pressure: (Believed to be all right.)

Percentage of Light Weight Braked: (Believed to be all right.)

General Arrangement of Brake Levers: (Believed to be all right.)

Details of Rods, Levers, etc.: (Believed to be all right.)
Location of Dummy Couplings: (Believed to be all right.)
Passenger Truck Pedestal: (It is possible that this standard could be slightly modified so as to produce a more pleasing outline, and also so as to introduce a third bolt in the upper flange and thus accomplish more secure fastening to the truck side timber.)
Screw Threads: (Believed to be all right.)

RECOMMENDED PRACTICE.

Dimension of Chill Moulds: (Believed to be all right.)
Specifications for Cast-Iron Wheels: (Believed to be all right.)
Guarantee for Cast-Iron Wheels: (Believed to be all right.)
Protection of Trainmen: (It is suggested that this standard should be carefully reconsidered and revised, with the idea of eliminating the demensions of detail parts and confining the recommendations of practice for the safety of trainmen to a few general suggestions without restrictions to certain dimensions. The present standards are so widely departed from that it would seem prudent to reconsider them and bring them into closer average conformity with existing practice.)
Platform Safety Chains: (It is suggested that this standard should be revised as a recommended practice, and made to relate only to the general use of platform safety chains, without defining and requiring a specific construction.)
Truck Check Chains: (Believed to be all right.)
Capacity of Draw Springs: (Believed to be all right.)
Limit Gauges for Round Iron: (Believed to be all right.)
Loading Logs, Poles and Bark: (Believed to be all right.)
Marking Cars: (The present standard relates only to the matter of spelling out in full the name of those railroads which have the same initials as one or more other railroads; but as it seems probable that the Association may ultimately adopt a recommended practice in the matter of marking cars, it would seem to be advisable to perpetuate the present standard as a recommended practice in anticipation of further legislation.)
Lettering and Numbering Fast Freight Line Cars: (The indications being that the present standard system is not observed because it is not satisfactory to the managers of fast freight lines and the officers of railroad companies who contribute cars to such fast freight lines, it is recommended that this standard should be given over for consideration to a special committee, with instructions to report a recommended practice after consultation with the Car Accountants' Association, and with the managers of fast freight lines.)

" It is the conviction of the committee that the method of publishing the standards of the Association is susceptible of improvement, and it begs to suggest that hereafter the standards and recommended practices of the Association shall be published in pamphlet form with references to lithographed drawings, the latter giving, when possible, full-size illustrations of the various standards and the various recommended practices. It is further suggested that these lithographed drawings should be uniform in size and should be made on strong transparent paper, so that blue prints can be taken from them direct. The pamphlets and lithographed sheets of

> reduced size could be bound into the Annual Proceedings, as now, under which circumstances it would seem proper to make a moderate charge for such pamphlets, and such full-size lithographs (of standards and recommended practices) as were issued to members or to others."

It was decided, upon motion, to submit these recommendations in so far as they are not modified by other action of the convention of 1893 to letter ballot.

The questions to be decided by letter ballot, therefore, are as follows:

First.—(*a*) Are you in favor of rescinding and abolishing from the published Standards of the Association the items in accordance with the recommendations of this committee, just given, and of dividing the remaining items of the present standards into "standards" and "recommended practice," in accordance with the suggestion of the committee, with the exception of the three items of Storing fast freight line cars on foreign roads; Dictionary of terms, and Entertainments, and of printing these with the Proceedings from year to year, but outside of the standards?

(*b*) Are you in favor of the adoption of the recommendation of the committee as given in the last paragraph of its report in regard to publishing the Standards, or Standards and Recommended Practice of the Association?

AXLES, JOURNAL BOXES, LIDS AND WEDGES.

The sub-committee which reported to the Convention in 1893 on the above subject presented drawings of the two standard journal boxes, journal box lids, journal bearings and wedges in full size, in conformity with the recommendation of the Committee on Standards above referred to, embracing three drawings for each of the standard journal boxes and its fittings. At the close of its report the committee says:

> "Your committee concurs in the recommendation of the Committee on Standards, that all drawings issued under the auspices of the Association as illustrating its standards, shall be uniform in size and shall be made on strong, transparent paper so that blue prints can be taken from them direct; also that lithographs of reduced size shall be bound into the Annual Proceedings as now."

Reduced size cuts of the drawings submitted by this committee are shown in Figs. 1, 2, 3, 4, 5 and 6, at end of volume.

It should be understood that no changes have been made in the dimensions of these parts, but only that the drawings are made more in detail and dimensioned on uniform principles so as to make the drawings clearer.

The question to be decided on this subject by letter ballot is therefore as follows :

(*c*) Are you in favor of substituting the drawings shown in reduced size in Figs. 1, 2, 3, 4, 5 and 6 in lieu of the standards as heretofore illustrated in the standards for Journal Box, Journal Box Lid, Journal Bearings and Wedges ?

HEIGHT OF DRAWBARS.

It was decided to submit to letter ballot the question of modifying the present standard height of drawbars for freight cars to conform to the height soon to be announced by the Interstate Commerce Commission as having been fixed by the American Railway Association in conformity with Act of Congress.

Since the convention, this announcement has been made by the Secretary of the Interstate Commerce Commission as follows :

> " That the standard height of drawbars for freight cars, measured perpendicular from the level of the tops of the rails to the centers of the drawbars, has been designated and determined by the American Railway Association mentioned in said Act, as and to be 34½ inches for standard gauge railroads in the United States, and 26 inches for narrow gauge railroads in the United States; that the maximum variation from such standard height to be allowed between the drawbars of empty and loaded cars, both for standard and narrow gauge railroads in the United States, has been fixed and determined by said Association at 3 inches; and that such determination has been duly certified by said Association to the Interstate Commerce Commission."

The question to be determined on this subject by letter ballot is therefore as follows :

(*d*) Are you in favor of making the standard height to which drawbars must conform in service on standard gauge railroads 34½ inches when empty, and on narrow gauge railroads 26 inches when empty, and that no greater variation be allowed between drawbars on empty and loaded cars for both standard and narrow gauge railroads than 3 inches ?

ATTACHMENT OF M. C.-B. COUPLERS TO CARS.

The committee on this subject reported in detail, showing the gradual development of construction for greater strength in the construction of draft rigging, and ended its report as follows :

> "The following is a summary of recommendations made by your committee in the foregoing report. The adoption of a standard for Recommended Practice in the method of attaching M. C.-B. couplers to cars, and the adoption of standards for (*a*) drawbar yoke, (*b*) drawbar stop, (*c*) follower, (*d*) front carrier iron, as shown in Fig. C.
>
> "The adoption of standard buffer blocks and location for same; also change and dimensions of deadwood blocks for use with M. C.-B. couplers, as shown in Figs. G, H and I.
>
> "The adoption of standard draft spring, 6¼ inches diameter, 8 inches long, with 22,000 pounds capacity and 2⅛ inches free motion.
>
> "The adoption of standard forms of tail end, as shown by Figs. A and B."

The questions to be determined, therefore, in this matter by letter ballot are the following :

(*e*) Are you in favor of the adoption of a standard drawbar yoke, drawbar stop, follower and front carrier iron, as shown in Fig. C ? (*See Fig. B, at end of volume.*)

(*f*) Are you in favor of adopting as a recommended practice the method of attaching M. C.-B. couplers to cars as shown in Fig. C ? (*See Fig. B, at end of volume.*)

(*g*) Are you in favor of the adoption, as a recommended practice or a standard, of the buffer block with location for same, for use with M. C.-B. couplers as shown in Figs. G, H and I ? (*See pages 52 and 53.*)

(*h*) Are you in favor of the adoption, as a recommended practice or a standard, of a draft spring, 6¼ inches in diameter, 8 inches long, with 22,000 pounds capacity and 2⅛ inches free motion ?

(*i*) Are you in favor of the adoption of standard forms of tail end for M. C.-B. couplers, as shown by Figs. A and B ? (*See page 51.*)

PROTECTION OF TRAINMEN FROM ACCIDENT.

The report of the Committee on Protection of Trainmen from Accident was referred to a sub-committee, which sub-committee recommended as follows :

> "The committee appointed to consider the report submitted June 15, on same subjects, would report as follows :
>
> "It has considered the report submitted and recommends as follows :

"1. That both subjects be included under the head of 'Recommended Practice,' in conformity with the suggestions of the Committee of 1892 on Standards of the Association.

"2. That the material under the head of 'Protection of Trainmen from Accident,' be modified as follows (with reference to present standards):

"Omit the last paragraph on page 282 of report of 1892 which reads, 'That the small platform placed at one end of freight cars to fasten the brake pawl to, etc., be discontinued; the ratchet wheel and pawl to be fastened to a suitable casting on the roof.'

"The first portion of this paragraph seems to be of a negative character as recommended practice, and the balance of the paragraph is superfluous because it is treated in the paragraph preceding it, which we do not propose to alter.

"Under 'Running Boards' we recommend the following wording:

"'The ends of the running boards of box cars to be made to project over end of cars and properly supported, so that the minimum distance between the ends of those on adjoining cars will not be less than 12 inches, and that the running boards be made not less than 2 feet wide.'

"Under 'Steps' we suggest to leave the first paragraph as it is now is, and to place the second paragraph under 'Ladders and Handholds' with some alterations (see below).

"Under 'Ladders and Handholds' we suggest that the whole matter be allowed to read as follows:

"'Each box and stock car should have two iron or wooden ladders with not less than five steps to each ladder; the steps to be not less than 3½ inches from side or end of car; each ladder to have a handhold on the roof directly over top of ladder. When iron ladders are used and placed on ends of car, the bottom step to have a guard or projection to prevent men from slipping when swinging around the end of car to get on the step.

"'When the ladder is placed on the ends of car a handhold should be placed on opposite side of the end of car from the ladder and when ladder is on sides of car, two such handles should be placed on each end of car about 24 inches above the bottom of the sill.

"'On all freight cars which are not equipped with ladders (such as flat cars) two handholds should be attached to each end sill. Handholds on end sills should have at least 2 inches clearance behind them, and all other handholds should have at least 2½ inches clearance behind them.

"'All handholds should be made of iron not less than ⅝ inch in diameter. Handholds on sides and ends of cars should be at least 2 feet long in the clear; those on end sills to be made shorter only when it is impossible to use this length.'

"Under the head of 'Lettering and Numbering Fast Freight Line Cars' this committee concurs with the report submitted to it, namely, that paragraph No. 2 reading 'doors should have no marks whatever,' be stricken out, and in its stead the following inserted:

"'Side doors to bear the initials of the road to which the car belongs, or the name of the line in which the car is used, together with the number of the car.'"

The questions to be decided by letter ballot therefore are as follows:

(*k*) Are you in favor of modifying the text of the standards as per the foregoing recommendation to be hereafter the Standards or Recommended Practice of the Association on the subject of protection of trainmen from accident?

(*l*) Are you in favor of modifying paragraph No. 2, as per the foregoing recommendation in the Standard or Recommended Practice of the Association on the subject of lettering and numbering fast freight line cars?

STANDARDS FOR BRAKE BEAMS.

It was decided upon motion to submit to letter ballot the question as to whether the Westinghouse brake beam shown in the Standards should not be dropped from the list of standards, as it is but little used. The question to be decided on this subject is:

(*m*) Are you in favor of omitting the illustration of the Westinghouse brake beam from the Standards of the Association?

DUMMY COUPLINGS FOR AIR BRAKES.

The question of location of dummy coupling for air-brake hose was brought before the convention, and a drawing was submitted showing another location for the dummy coupling which was believed would cause less kinks in the hose and result in less cost for repairs to hose. This location is shown in Fig. 7, and the question to be decided on this subject by letter ballot is as follows: (*See Fig. 9, at end of volume.*)

(*n*) Are you in favor of the adoption of the location for dummy coupling for air-brake hose as shown in Fig. 7, in place of the old Standard of the Association, and of omitting the dummy coupling bracket now shown in the brake details?

MASTER CAR-BUILDERS' ASSOCIATION REPORTS.

It was decided upon motion to submit to letter ballot the question whether the size of the reports of the Master Car-Builders' Association should not be adopted as standard and be made the same as the size now used, namely, 6 inches by 9 inches.

The question to be decided on this subject is, therefore, as follows:

(*o*) Are you in favor of the adoption of a standard size for Master Car-Builders' Association reports of 6 inches by 9 inches?

The questions above stated, and which are herewith submitted to letter ballot, are referred to by their respective letters on the accompanying slip, and each member is requested to vote by writing "Yes" or "No" opposite each question on the accompanying slip and remailing it to the Secretary at the address given below. The votes will be counted September 15, 1893, and any votes not received at the Secretary's office before that date will be excluded from the count, as provided by the Constitution.

The votes must be either "Yes" or "No," as no qualified vote can be counted.

The number of votes should agree with the bills for 1893, or the Secretary should be advised of any needed corrections.

JNO. W. CLOUD,
Secretary.

974 ROOKERY BUILDING,
CHICAGO, Ill., July 13, 1893.

LETTER BALLOT VOTING SLIP.

Members are requested to vote by writing "Yes" or "No" on this slip opposite each of the following questions, signing the vote and remailing it to the Secretary, at 974 Rookery Building, Chicago, Ill.

The vote will be counted September 15, 1893, and any ballots not received before that date will be excluded as provided by the Constitution.

All votes must be either "Yes" or "No" to each question, as no qualified vote can be counted.

The number of votes should agree with the bills for 1893, or the Secretary should be advised of any needed corrections in returning the vote.

(*a*) Are you in favor of the proposition "a" on circular herewith, as M. C.-B. Standard "a". .....

(*b*) " " " "b" " " " " "b".......

(*c*) " " " "c" " " " " "c".......

(*d*) " " " "d" " " " " "d".......

(*e*) " " " "e" " " " " "e".......

(*f*) " " " "f" " " " " "f".......

(*g*) " " " "g" " " " " "g".......

(*h*) " " " "h" " " " " "h".......

(*i*) " " " "i" " " " " "i".......

(*k*) " " " "k" " " " " "k".......

(*l*) " " " "l" " " " " "l".......

(*m*) " " " "m" " " " " "m".......

(*n*) " " " "n" " " " " "n".. ....

(*o*) " " " "o" " " " " "o".......

Sign name here...

Number of votes to which member is entitled...

RESULT OF LETTER BALLOTS.

A summary of the votes cast on each of the questions submitted to letter ballot is given below, together with the result of the ballot. For details of vote, see end of volume.

SUBJECTS VOTED ON.	Question.	NUMBER VOTES CAST. Affirmative.	Negative.	Total.	No. Votes necessary for Adoption.	Results of Ballot.
Abolishing certain Standards and dividing the remainder into Standards and Recommended Practice..............	a	870	1	871	581	Adopted.
Method of publishing Standards and Recommended Practice..............	b	871	0	871	581	"
New Standard drawings of Journal Boxes and contained parts	c	857	14	871	581	"
Standard Height of Drawbar 34½ Inches	d	844	27	871	581	"
Standard Drawbar Yoke, Stop, Follower and Front Carrier Iron	e	471	394	865	577	Rejected.
Recommended Practice for attaching M. C.-B. Couplers to cars	f	644	220	864	576	Adopted.
Recommended Practice for Buffer Blocks and location, with M. C.-B. couplers...	g	525	286	811	541	Rejected.
Recommended Practice for Draft Spring of increased capacity................	h	821	44	865	577	Adopted.
Standard forms of Tail-end for M. C.-B. Couplers	i	693	120	813	581	"
Recommended Practice for protection of trainmen from accident	k	689	182	871	581	"
Recommended Practice for Lettering and Numbering Fast Freight Line Cars	l	592	176	768	512	"
Omitting Westinghouse Brake Beam from the drawings......................	m	854	7	861	574	"
Standard location of Dummy Coupling for air-brake hose..................	n	777	94	871	581	"
Standard size of M. C.-B. report, 6 by 9 inches	o	839	32	871	581	"

MISCELLANEOUS.

The following items, formerly among the Standards, are given on account of the recommendations of the Association, and the information contained:

STORING OF LINE CARS ON FOREIGN ROADS.

At the Seventeenth Annual Convention, held in Chicago in June, 1883, the follow resolutions were adopted (*see page 109 of the report of that meeting*):

" *Whereas*, It is a common practice to store line cars on side tracks during summer months or dull times, away from home, after they have been in severe service; and

" *Whereas*, Many of the cars after being so stored are found to be more or less out of proper condition, so that they need more or less repairs, and when put into service cause much detention to traffic and many transfers:

" *Be it Resolved, therefore*, That it is the sense of this meeting that all line cars owned by foreign companies should be returned to their owners instead of being stored on foreign tracks, and that a competent man should be detailed to inspect the stored cars and to arrange to have the necessary repairs made during the time such cars are out of service."

DICTIONARY OF TERMS.

At the Fifth Annual Convention, held in Richmond, Va., in 1872 (*see page 18 of report of that meeting*), it was

" *Resolved*, That a committee be appointed with power to publish an illustrated book, defining the proper terms or names of each and every part used in the construction of railway cars, and a description of the use of the same."

At the Fourteenth Annual Convention, held in Detroit in 1880 (*see pages 11 to 20 of the report of that meeting*),

" The committee to which was assigned the duty of preparing a dictionary of terms used in the construction of cars submitted a copy of the book and reported that it had finished its work, and it was discharged."

ENTERTAINMENTS.

At the Ninth Annual Convention, held in New York in 1875, the following resolution was adopted (*see page 113 of report of that meeting*):

" *Whereas*, The practice of entertaining the members of this Association by its friends has become an established custom, and has thus assumed somewhat the character of an obligation to which those who have so generously dispensed hospitality have in a measure felt themselves obliged to conform; and

" *Whereas*, The expenditure of time and money for this purpose has in many cases been very much greater than the members of this Association have a right to expect should be devoted to their enjoyment; and

" *Whereas*, The expense of such hospitality has in some cases been interpreted as having a significance which has been the cause of embarrassment to members:

" *Therefore*, We desire by this resolution, first, to express our thanks for the liberality of our friends in the past; and, secondly, to make the request in this public way that in the future there shall be no more expenditure of money for the public entertainment of members of this Association."

The preamble and resolution were unanimously adopted.

CONSTITUTION AND BY-LAWS

OF THE

MASTER CAR-BUILDERS' ASSOCIATION.

ARTICLE I.

NAME.

SECTION 1. The name of the Association shall be "The Master Car-Builders' Association."

ARTICLE II.

OBJECTS AND LIMITS OF ACTION.

SECTION 1. The objects of this Association shall be the advancement of knowledge concerning the construction, repair and service of railroad cars, by discussions in common, investigations and reports of the experience of its members; to provide an organization through which the members, and the companies they represent, may agree upon such joint action as may be required to bring about uniformity and interchangeability in the parts of railroad cars, to improve their construction and to adjust the mutual interest growing out of their interchange and repair; but the action of the Association shall have only a recommendatory character, and shall not be binding upon any of its members or the companies represented in it.

ARTICLE III.

MEMBERSHIP.

SECTION 1. There shall be three classes of members—Active, Representative and Associate Members. Each member must sign the Constitution or authorize the Secretary to sign for him.

SEC. 2. Any person holding the position of Superintendent of the Car Department, Master Car-Builder, Foreman of a Railroad Car Shop, Joint Car Inspector, or one representative from each Car Manufacturing Company, or other company owning over one thousand cars, which are not in process of purchase by other parties, may become an Active Member by paying his dues for one year. Unless expelled from the Association his membership shall continue until his written resignation is received by the Secretary.

SEC. 3. Any person having a practical knowledge of car construction may become a Representative Member by receiving a *written* appointment from the President, General Manager or General Superintendent of any railroad company to represent its interests in the Association; provided that no Representative Member shall represent more than one railroad or system of roads under one General Manager or General Superintendent. Such member shall have all the privileges of an Active Member, including one vote on all questions, and in addition thereto shall, on all measures pertaining to the adoption of standards or the expenditure of money, have one more vote for each full one thousand cars which are owned, or which are in use and in process of purchase, by the road or system which he represents. His membership shall continue until notice is given the Association of his withdrawal, or of the appointment of his successor. No railroads or system of roads, under one General Manager or General Superintendent, shall have more than one Representative Member. In the enumeration of four, six, eight or more wheeled cars, four axles to count as one car.

SEC. 4. Civil and mechanical engineers, or other persons having such a knowledge of science, or practical experience in matters pertaining to the construction of cars as would be of especial value to the Association or railroad companies, may become Associate Members on being recommended by three members not associates. The names of such candidates shall then be referred to the Executive Committee, which shall report to the Association on their fitness for such membership. They shall be elected by ballot at any regular meeting of the Association, held not less than six months after a candidate has been proposed, and five dissenting votes shall reject. The number of Associate Members shall not exceed twenty. Associate Members shall be entitled to all the privileges of Active Members, excepting that of voting and being elected to office in the Association.

SEC. 5. Any member who, during the meetings of the Association, shall be guilty of dishonorable conduct which is disgraceful to a railroad officer and a member of the Association, or shall refuse to obey the Chairman when called to order, may be expelled by a vote of two-thirds of the members present at any meeting held within one year from the date of the offense.

ARTICLE IV.

OFFICERS.

SECTION 1. The officers of the Association shall be a President, three Vice-presidents, a Treasurer, Secretary, and six Executive Members. The six Executive Members, with the President, Vice-presidents and Treasurer, shall constitute the Executive Committee.

ARTICLE V.

DUTIES OF OFFICERS.

SECTION 1. The duties of all officers shall be such as usually pertain to their offices, or may be delegated to them by the Executive Committee of the Association.

ARTICLE VI.

EXECUTIVE COMMITTEE.

SECTION 1. The Executive Committee shall exercise a general supervision over the interests and affairs of the Association, recommend the amount of the annual assessment, call, prepare for and conduct general conventions, and make all necessary purchases, expenditures and contracts required to conduct the current business of the Association, but shall have no power to make the Association liable for any debt to an amount beyond that which at the time of contracting the same shall be in the Treasurer's hands in cash, and not subject to prior liabilities. All expenditures for special purposes shall only be made by appropriations acted upon by the Association at a regular meeting.

SEC. 2. The Executive Committee shall make a report of the proceedings of each of its meetings, such reports to be made accessible to all the members of the Association. It shall have the proceedings of the regular meetings of the Association published, subject to instructions from the latter. It shall have power to withhold from the published proceedings papers and reports containing old matter readily found elsewhere, those specially meant to advocate personal interests, those carelessly prepared or controverting well-established facts, and those purely speculative or foreign to the purposes of the Association, or any which in the opinion of the committee are unworthy of publication; it being understood, though, that this discretion shall always be exercised subject to the action of the Association.

SEC. 3. Two-thirds of the members of the Executive Committee may call special meetings of the Association, to be held not less than thirty days after a notice thereof has been mailed to each member of the Association.

SEC. 4. Five members of the Executive Committee shall constitute a quorum for the transaction of business.

ARTICLE VII.

ELECTION AND APPOINTMENT OF OFFICERS AND TENURE OF OFFICE.

SECTION 1. The officers, excepting as otherwise herein provided, shall be elected at the regular meeting of the Association, held in June of each year, and the election shall not be postponed excepting by unanimous consent.

PRESIDENT AND TREASURER.

SEC. 2. The President and Treasurer shall be elected by written ballots by a majority of the votes cast, and shall hold office for one year, or until successors are chosen.

VICE-PRESIDENTS AND EXECUTIVE MEMBERS.

SEC. 3. The Vice-presidents shall hold office for one year, and Executive Members for two years, or until successors are chosen. Three Vice-presidents and three Executive Members to be elected each year; provided, however, that three of the latter shall be appointed by the President holding office at the time of the adoption of this amendment. The Executive Members thus appointed to hold office until successors are chosen at the annual meeting following.

SEC. 4. In the election of Vice-presidents each Active and Representative Member may cast as many votes as there are Vice-presidents to be elected. The number of votes may be given to one candidate or distributed among more, as the person entitled to cast them may choose. Executive Members shall be voted for in the same way. The three candidates for each of the offices named who receive the largest number of votes shall be declared elected.

SECRETARY.

SEC. 5. A Secretary, who may or may not be a member of the Association, shall be appointed by a majority of the Executive Committee at its first meeting after the annual election, or as soon thereafter as the votes of a majority of the members of the

Executive Committee can be secured for a candidate. The term of office of the Secretary thus appointed, unless terminated sooner, shall cease at the first meeting, after the next annual election succeeding his appointment, of the Executive Committee organized for the transaction of business. Two-thirds of the members of the Executive Committee shall, however, have power to remove the Secretary at any time. His compensation, if any, shall be fixed for the time that he holds office by a vote of a majority of the Executive Committee. He shall also act as Secretary of the Executive Committee.

TREASURER.

SEC. 6. The Treasurer shall be required to give bonds to an amount which a majority of the members of the Executive Committee demand. No bill shall be paid by him for the Association, excepting for current expenses, until it has been certified by the person or persons authorized to contract it, and audited by the Executive Committee.

ARTICLE VIII.

COMMITTEES.

SECTION 1. At the first session of the annual meeting the President shall appoint a Nominating Committee of five members, who are not officers of the Association, and this committee shall send the names of nominees for officers of the Association to fill vacancies for the ensuing year to the Secretary before the election of officers is in order, and they shall be announced by him as soon as received. The election shall not be held until the day after such announcement, excepting by unanimous consent. Any three other members may nominate candidates for any office.

AUDITING COMMITTEE.

SEC. 2. At the first session of each annual meeting an Auditing Committee, consisting of three members not officers of the Association, to be nominated by any member who does not hold office, shall be elected in the same way as Vice-presidents and Executive Members are voted for. This Auditing Committee shall examine the accounts and vouchers of the Treasurer and certify whether they have been found correct or not. After the performance of this duty they shall be discharged by the acceptance of their report by the Association.

COMMITTEE ON SUBJECTS FOR INVESTIGATION AND DISCUSSION.

SEC. 3. At each annual meeting the President shall appoint a committee whose duty it shall be to report at the next annual meeting subjects for investigation and discussion, and if the subjects are approved by the Association, the President, as hereinafter provided, shall appoint committees to report on them. It shall also be the duty of the committee to receive from members questions for discussion during the time set apart for that purpose. This committee shall determine whether such questions are suitable ones for discussion, and if so, they shall so report them to the Association.

COMMITTEES OF INVESTIGATION.

SEC. 4. When the Committee on Subjects has reported and the Association approved of subjects for investigation, the President shall appoint special committees to investigate and report on them, and he may be authorized to appoint a special committee to investigate and report on any subject which a majority of the members present may approve of.

ARTICLE IX.

THE RECOMMENDATION OF STANDARDS.

SECTION 1. Any proposition recommending the adoption of standard constructions or practice shall be in writing and be accompanied by drawings if the latter are necessary for a clear understanding of the subject. Such proposition shall then be submitted to the Association for discussion, after which a vote shall be taken to decide whether the proposition shall be submitted for decision by letter-ballot to all the members entitled to vote. If decided in the affirmative the Secretary, within three months from the time the vote of the Association is taken on such measure, shall send by mail to each member a blank ballot, and a copy of the proposed recommendation, with a report — to be approved by the Executive Committee — of the discussion thereon. Such ballot to be filled up, signed and remailed to the Secretary, who shall count all the ballots received within sixty days from the date that they were sent to members, and he shall then announce the vote in such manner as the Executive Committee may prescribe. Any recommendation securing two-thirds of the votes cast shall be adopted by the Association.

SEC. 2. All reports, resolutions and recommendations involving the use, or proposed use, by railroad companies, of any device or process which forms the subject matter of any existing patent, shall first be submitted to the Executive Committee, and shall be submitted to the Association only by the Executive Committee.

ARTICLE X.

ANNUAL CONTRIBUTIONS.

SECTION 1. Every member will be subject to the payment of annual dues, to be assessed at each annual meeting, to defray the necessary expenses of the Association, provided that no assessment shall exceed $8. Each Representative Member shall pay, in addition to his own dues so assessed, the same amount for each additional vote to which he is entitled.

Such dues shall be payable when the amount thereof is announced by the President at each annual meeting, and no member who is one year in arrears shall be entitled to a voice in the Association. The name of any member who is three years in arrears for dues may be struck from the list of members at the discretion of the Executive Committee.

ARTICLE XI.

AMENDMENTS.

SECTION 1. This Constitution may be amended at any regular meeting by a two-thirds vote of the members present, *provided* that written notice of the proposed amendment has been given at a previous meeting at least six months before.

BY-LAWS.

TIME OF MEETING.

I. The regular meeting of the Association shall be held annually on the second Tuesday in June.

HOURS OF SESSION.

II. The regular hours of session shall be from 9 o'clock A.M. to 1:30 o'clock P.M.

PLACE OF MEETING.

III. The place for each annual meeting shall be fixed at least six months before the date for the annual meeting, by a committee consisting of the President, three Vice-presidents, and the Secretary, acting jointly with a committee of the American Railway Master Mechanics' Association.

QUORUM.

IV. At any regular meeting of the Association fifteen or more members entitled to a vote shall constitute a quorum.

ORDER OF BUSINESS.

V. The business of the meetings of the Association shall, unless otherwise ordered by a vote, proceed in the following order:

1st. Calling the roll.
2d. Reading the minutes of the last meeting.
3d. Address by the President.
4th. Admission of new members.
5th. Reports of Secretary and Treasurer.
6th. Assessment and announcement of annual dues.
7th. Appointment of Nominating and other committees.
8th. Election of Auditing Committee.
9th. Unfinished business.
10th. New business.
11th. Reports of committees.
12th. Reading and discussing questions propounded by members.
13th. Routine and miscellaneous business.
14th. Election of officers.
15th. Adjournment.

RULES GOVERNING THE CONDITION OF, AND REPAIRS TO, FREIGHT CARS FOR THE INTERCHANGE OF TRAFFIC.

VI. The revision of the Rules of Interchange shall be the special order of business at 10 o'clock A.M. on the second day of each annual convention, unless otherwise ordered.

QUESTIONS FOR DISCUSSION, SPECIAL ORDER OF.

VII. Unless otherwise ordered the discussion of questions proposed by members shall be the special order at 12 o'clock M. of each day of the annual meeting.

DECISIONS.

VIII. The votes of a majority of the members present shall be required to decide any question, motion or resolution which shall come before the Association, unless otherwise provided.

DISCUSSIONS.

IX. No questions or discussions as to the regulation of wages, or the amount to be paid by the day, week or month, or the number of hours that shall constitute a day's work of employés, shall be allowed at the meetings of this Association.

X. No patentees or their agents shall be admitted in the meetings of the Association for the purpose of advocating the claims of any patent, or patentee, unless by unanimous consent.

XI. No member shall speak more than twice in the discussion of any question until all the other members who want to speak and have not been heard have spoken.

Obituary.

D. H. NEALE.

DEODATUS HILIN NEALE, elected an associate member of the Master Car-Builders' Association in 1888, died in Brooklyn, New York, April 5, 1893. Mr. Neale was also, and had been for more than twenty years, an associate member of the Institution of Civil Engineers of England, and his name was known and esteemed in many countries. He was born in England, September 5, 1849. He was educated there as an engineer, receiving sound grounding in fundamental principles and in details of practice. He served for a time as Chief Draftsman in the Locomotive Department of the London & North-Western Railway and afterward went to Cape Colony as Assistant Locomotive Superintendent on the Colonial roads. In 1883 he came to the United States to represent the *Engineer* at the Chicago Exposition of Railway Appliances. In November of that year he joined the editorial staff of the *Railroad Gazette* and remained with that journal until November, 1888, when he went to New South Wales as Mechanical Engineer to the Railway Commission. In 1892 he returned to the United States and in November of that year again entered the service of the *Railroad Gazette*. At the time of his death he was associate editor of the *Railroad Gazette*, but was chiefly engaged in editing the new edition of the Car-Builders' Dictionary. His death was sudden, and was immediately due to cerebral meningitis.

Mr. Neale was a man of unusual gifts and attainments. He had a keen faculty for mechanics, a quick and strong mind and a retentive memory. With these qualities to build on, his thorough training had made him a very competent engineer. But his tastes and habits were those of a scholar, and led him to prefer study and writing rather than administrative work. Moreover, he had an extraordinary command of written English, though not a ready speaker. In simplicity, clearness and force few modern scientific writers have surpassed him. It was natural therefore that he should have returned to editorial work with pleasure and with the hope that it would be his life work.

His recent residence abroad had made him more appreciative than ever of American methods and American products; and on the whole we must conclude that in his untimely death the engineering manufacturers of the nation lost a valuable friend, scientific journalism lost a distinguished writer, and the Master Car-Builders' Association lost a member whose broad experience and mature mind gave promise of great usefulnesss.

H. G. PROUT.
A. E. MITCHELL.

Obituary.

ROBERT HITCHCOCK.

Robert Hitchcock was born in Palmer, Massachusetts, December 3, 1829. At the age of fifteen he commenced the trade of carpenter, and after three years' service at this trade he went, at the age of eighteen, into the car shop of Dwight, French & Co., at Seymour, Connecticut, remaining there until he went to Springfield, Massachusetts, in 1849.

He was then employed in the shops of Wason & Co., Springfield, Massachusetts, where they were situated at that time, and he remained with them until 1851, when he entered the employ of the Connecticut River Railroad as inspector and repairer.

The shops of this company were then located at Northampton, Massachusetts, but in 1862 they were removed to Springfield, and Mr. Hitchcock was appointed Master Car-Builder. This position he held until quite recently, when, on account of failing health, he resigned, having been in the service of the Connecticut River Railroad Company for forty-one years.

Mr. Hitchcock had an inventive mind, and made quite a number of improvements, which were adopted by the Connecticut River Railroad Company. Among others he invented what was called the Carroll Ventilator, which was largely used by various railroads in the country.

Mr. Hitchcock was quite popular with his employés, and was a genial and social man. He became a member of the Master Car-Builders' Association in 1884. He had been married three times, but was a widower at the time of his death, his wife having died a few weeks previous. Two sons and two daughters survive him.

J. T. Chamberlain.
F. D. Adams.

Obituary.

JOHN ORTTON.

JOHN ORTTON died January 6, 1893, at his home in Frankfort, Indiana. Mr. Ortton was one of the pioneers of the Association, an indefatigable worker, original in his ideas, and of great executive ability, and a man in every sense of the word.

Mr. Ortton was born in Nottingham, England, March 11, 1825, and entered into his apprenticeship to the trade of millwright and engineer in March, 1838, in Sunderland.

In 1844 he began work as a fitter in the locomotive works of Robert Stephenson & Co., Newcastle-on-Tyne. In 1847 he was employed in the locomotive department of the London & North-Western Railway, at Wolverton, and from that time until 1865, except a few months in 1864, he was engaged in the locomotive departments of British railways, most of the time as foreman. For some years he was foreman of the locomotive and car departments of the Londonderry & Enniskillen Railway, at Londonderry, Ireland.

During 1865 and 1866 he was manager of the locomotive works of George England & Co., at Hatcham, New Cross, London, and in January, 1867, was engaged as manager of the locomotive workshops of the London & South-Western Railway, at Nine Elms, London.

In the autumn of 1873 he left England to become Assistant Mechanical Superintendent of the Great Western Railway of Canada, and in May, 1875, he assumed the duties of Mechanical Superintendent of that road.

In 1876 he became Mechanical Superintendent of the Canada Southern Railway, leaving this position in 1882 to become General Manager of the Portage, Wesbourne & North-Western Railway of Manitoba. His connection with this road was terminated in a few months by serious illness, and in 1883 he went to the New York Central & Hudson River Railroad, as Master Mechanic, at West Albany. This position he resigned in 1888.

In May, 1890, he was appointed Superintendent of Motive Power and Rolling Stock of the Toledo, St. Louis & Kansas City Railroad, and he held this position until compelled to give up all work by the illness which resulted in his death.

W. I. COOKE.
C. H. CORY.
THOMAS SUTHERLAND.

Obituary.

GEORGE HAMILTON GRAMLING.

George Hamilton Gramling was born at Spartanburg, South Carolina, December 30, 1842. At an early age he removed with his parents to Marietta, Georgia, and subsequently to Atlanta, Georgia, where he was educated at the Wilson Academy. In 1858 he entered the service of the Western & Atlantic Railroad, there serving his trade as carpenter.

On May 18, 1861, he entered the Atlanta Greys, afterward Company F, 8th Georgia Regiment, Anderson Brigade, Hood's Division, Army of Northern Virginia. He was wounded and made prisoner at the first battle of Manassas, July 21, 1861. He was afterward exchanged and engaged in the following battles: Fredericksburgh, Chancellorsville, Gettysburg, Fort Brownlow, Wilderness, Spottsylvania, Cold Harbor and Fort Harrison. He was again wounded August 16, 1864.

After the war he was engaged in building and contracting in Atlanta, but soon accepted a position as timekeeper and bookkeeper for his father, who was Master Car-Builder of the Western & Atlantic Railway.

From April, 1872, until 1876 he filled the position of foreman of car shops on the Atlanta & Charlotte Air Line, and from 1876 to June, 1877, was Master Car-Builder on the same line.

December 16, 1878, he was appointed Master Car-Builder of the South Carolina Railway at Charleston, South Carolina, which position he held until his death, October 8, 1892.

He represented the first ward of Atlanta in council in 1876 and 1877.

Mr. Gramling was delegated by the governor of South Carolina to get up an exhibit of native woods for the New Orleans Exposition, 1884, and in 1888 he was appointed by the governor as delegate to the Forestry Congress held in Atlanta. He joined the Master Car-Builders' Association in 1883.

Mr. Gramling was a member of the Masonic Order, having obtained the 18th degree of the A. & A. S. Rites. He was also a member of the I. O. O. F., Knights of Honor, I. O. R. M. and the Railway Benevolent Association.

In 1867 he was married to Miss Lois J. Green, who with two sons and one daughter survive him.

Mr. Gramling was faithful in all the relations of life, doing his duty with trustworthy energy, as witness the many responsible positions he has filled. He was a conscientious employé, devoting himself to the interest of, and giving entire satisfaction to, those by whom he was employed.

Such a man has only to be known to be appreciated, and our Association honors itself by honoring him, and in inscribing his name with this brief memoir on the pages of its journal.

E. M. Roberts.
W. H. Day.

SUBJECTS AND COMMITTEES

FOR

Convention, June, 1894.

The Executive Committee has arranged the following Committees of investigation for 1894:

1.—Tests of M. C.-B. Couplers.

To arrange for and conduct further tests, if necessary, and to consider and report upon all other questions connected with M. C.-B. Couplers, which the committee finds desirable.

J. M. Wallis.
J. S. Lentz.
R. D. Wade.
J. H. McConnell.
S. A. Crone.
T. G. Duncan.

2.—Air-brake Tests.

To investigate and report in detail what further tests are necessary to insure the best available service.

G. W. Rhodes.
S. P. Bush.
Geo. Gibbs.
A. S. Vogt.
E. A. Williams.

3.—Steel-tired Wheels.

To investigate further and report, embracing all steel-tired wheels in use, and to give the number of parts, and weights of principal parts; method of tire fastening illustrated by drawings, and liability of parts to get loose. Also to describe methods of re-tiring, and to consider proper limits of thickness for tires.

R. E. Marshall.
J. O. Pattee.
C. H. Cory.
A. E. Mitchell.
H. Bartlett.
T. A. Bissell.

4.—Road Tests of Brake Shoes.

To conduct and report upon a series of comparative tests of different brake shoes in actual service, with as complete data as possible.

R. H. Soule.
W. S. Morris.
S. A. Crone.
G. W. Rhodes.
A. E. Mitchell.
W. H. Lewis.
J. W. Marden.
A. M. Waitt.
Jos. Townsend.
Sam'l Porcher.
J. C. Barber.
W. L. Hoffecker.

5.—Laboratory Tests of Metal for Brake Shoes.

To conduct and report upon laboratory tests of different brake shoes, with as complete data as possible.

S. P. Bush.	D. L. Barnes.	J. W. Cloud.

6.—Brake Beams.

To consider the recommendations made by Committee on Brake Beams in its report of 1893, and to recommend in detail what steps are necessary to secure greater uniformity.

E. D. Nelson.	J. H. Rankin.	John Bean.

7.—Safety Chains for Freight Cars.

To report recommendations for standard location and arrangement, to suit freight cars of all classes, and to recommend practice for attaching same.

H. Coulter.	J. E. Simons.	J. J. Casey.
W. H. Day.	E. E. Carver.	

8.—Heating Passenger Equipment.

To report what progress is being made in heating cars by steam or other improved methods, and to review the different plans now in use.

W. L. Hoffecker.	Geo. F. Wilson.	John Hodge.
Jas. Macbeth.	A. J. Cromwell.	

9.—Ventilation of Passenger Equipment.

To investigate systems now in use, and to offer suggestions as to the correct principles for ventilation.

R. P. C. Sanderson.	A. C. Robson.	J. M. Holt.
Wm. Forsyth.	G. W. West.	

10.—Lighting Passenger Equipment.

To consider progress made in advanced methods for same.

C. A. Schroyer.	L. B. Paxson.	L. Packard.
W. H. Fry.	Wm. Apps.	

11.—Wheel and Flange Gauges.

To prepare maximum gauges for thickness of wheel flanges, and to consider wheel gauges in their relation to the track; also to offer any suggestions as to wheel and track gauges, and to confer with similar committees from other Associations, should such be appointed.

J. N. Barr. T. Sutherland. Thos. Fildes.
Thos. Anderson. Jos. Townsend.

12.—Lubrication of Cars.

To consider the practice on different roads as to lubrication and the prevention of hot boxes; also the kind and quality of lubricants used, with cost of same.

A. M. Waitt. I. E. Wood. W. K. Carr.
W. H. Thomas. F. A. Stinard.

13.—Air-brake and Hand-brake Apparatus on Cars.

To report upon what is being done, and what should be done, to improve the maintenance of same on both freight and passenger equipment, and to insure the best possible service.

E. D. Bronner. Jas. McGee. W. P. Siddons.
Pulaski Leeds. Wm. McWood.

14.—Compressed Air Appliances and Hydraulic Machinery.

To report upon the application and utility of such apparatus for use in car shops.

J. C. Barber. Wm. Cormack. J. R. Skinner.
Wm. Garstang. H. L. Preston.

15.—Freight Car Trucks.

To consider the advisability of adopting standard sizes and shapes for arch bars and channel transoms for diamond truck, and to recommend sizes and shapes if desirable, and to ascertain the results obtained from the use of trucks of various designs, with special reference to the newer forms of trucks.

J. J. Hennessy. Wm. Voss. F. H. Stark.
Sam'l Irvin. John H. Davis.

JNO. W. CLOUD,
Secretary.

974 Rookery Building, Chicago, Ill.
August 15, 1893.

LIST OF OFFICERS AND MEMBERS

OF THE

MASTER CAR-BUILDERS' ASSOCIATION.

OFFICERS FOR 1893-94.

PRESIDENT.

E. W. GRIEVES, Baltimore & Ohio Railroad, Baltimore, Md.

VICE-PRESIDENTS.

J. S. LENTZ, Lehigh Valley Railroad, Packerton, Pa.
S. A. CRONE, New York Central & Hudson River R. R., New York, N. Y.
T. A. BISSELL, Wagner Palace Car Co., Buffalo, N. Y.

TREASURER.

G. W. DEMAREST, Northern Central Railway, Baltimore, Md.

EXECUTIVE MEMBERS.

*R. C. BLACKALL, Delaware & Hudson Canal Co., Albany, N. Y.
*J. M. WALLIS, Pennsylvania R. R. Co., Altoona, Pa.
*J. C. BARBER, Northern Pacific Railroad, St. Paul, Minn.
†J. T. CHAMBERLAIN, Boston & Maine Railroad, Lawrence, Mass.
†G. W. RHODES, Chicago, Burlington & Quincy Railroad, Aurora, Ill.
†PULASKI LEEDS, Louisville & Nashville Railroad, Louisville, Ky.

SECRETARY.

JOHN W. CLOUD, 974 Rookery, Chicago, Ill.

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*Term of office expires June, 1895.
†Term of office expires June, 1894.

LIST OF MEMBERS.

The names of Active members are printed in Roman type, Representative members in Italics and Associate members in Small Capitals.

Date of becoming member.	Name.	Railroad Company.	No. of Cars Owned.	Address.
1882	*Adams, F. D.*	*Boston & Albany*	7,089	*Allston, Mass.*
1890	Agnew, J. H.	South Carolina	......	Charleston, S. C.
1892	Aldcorn, Thos.	West Shore	......	New Durham, N. J.
1892	*Allen, A. B.*	*South Florida*	599	*Sanford, Fla.*
1886	*Ames, La Mott*	*Beech Creek*	2,327	*Jersey Shore, Pa.*
1889	*Anderson, Thos.*	*Pittsburgh & Western*	6,002	*Alleghany, Pa.*
1889	Anderson, Geo. T.	Ind. Car & Fdy. Co.	......	Indianapolis, Ind.
1887	*Apps, Wm.*	*Illinois Central*	16,475	*Chicago, Ill.*
1887	*Augustus, Willis*	*Keokuk & Western*	950	*Centreville, Ia.*
1867	Baker, David H.	Pennsylvania	......	Jersey City, N. J.
1888	Baker, J. W.	Del. Lackawanna & Western	......	Dover, N. J.
1893	*Ball, A. J.*	*Col'bus, Shawnee & Hocking*	4,062	*Columbus, O.*
1884	*Barr, J. N.*	*Chi. Milwaukee & St. Paul*	27,291	*Milwaukee, Wis.*
1883	*Barber, J. C.*	*Northern Pacific*	19,665	*St. Paul, Minn.*
1891	BARNES, D. L.	THE RAILROAD GAZETTE	......	768 ROOKERY BLDG., CHICAGO, ILL.
1892	Bartlett, H.	Pennsylvania R. R.	......	Altoona, Pa.
1890	*Bean, John*	*Cleve. & Canton & Southern*	2,765	*Canton, O.*
1890	Biester, Rudolph	......	......	5327 Wentworth Ave., Chicago, Ill.
1893	Billingham, Jos.	Gulf Colo. & Santa Fé	......	Galveston, Texas.
1881	Bissell, T. A.	Wagner Palace Car Co.	......	Buffalo, N. Y.
1883	*Blackall, R. C.*	*Delaware & Hud. Canal Co.*	17,232	*Albany, N. Y.*
1882	Blackwell, Chas.	Schoenberger & Co.	......	Cincinnati, O.
1880	Blackwell, K. W.	Manufacturer	......	Canal & Conde St., Montreal, Can.
1887	Boatman, F. P.	......	......	Ludlow, Ky.
1890	Bossinger, H. C.	Chesapeake & Ohio	......	Huntington, W. Va.
1890	Bossinger, J. J.	E. Tenn. Va. & Georgia	......	Knoxville, Tenn.
1889	Boutet, H.	......	......	Ludlow, Ky.
1891	Bowen, H. A.	Swift's Refrigerator Car Co.	......	Chicago, Ill.
1885	Bradley, Osgood	Bradley Car Works	......	Worcester, Mass.
1873	Bray, F. O.	Lake Shore & Mich. South'rn	......	Adrian, Mich.
1893	Brazier, F. W.	Chic. Boston & Liverpool Co.	......	Elsdon, Ill.
1891	Brimson, W. G.	The Calumet & Blue Island	......	Chicago, Ill.
1889	*Bronner, E. D.*	*Michigan Central*	15,113	*Detroit, Mich.*
1891	*Brück, H. T.*	*Cumberland & Pennsylvania*	564	*Mt. Savage, Md.*
1882	*Bryan, H. S.*	*Duluth & Iron Range*	......	*Two Harbors, Minn.*

LIST OF MEMBERS—*Continued.*

Date of becoming member.	NAME.	RAILROAD COMPANY.	NO. OF CARS OWNED	ADDRESS.
1885	*Buchanan, Wm.*	*N. Y. Cent. & Hud. River, N. Y. West Shore & Buffalo and Rome, Wat. & Ogdensburgh*	53,127	*Grand Central Depot, New York City.*
1892	Buker, Joseph	Hick's Stock Car Co.		Chicago, Ill.
1892	*Burton, E.*	*Florida Central & Peninsular*	1,119	*Jacksonville, Fla.*
1893	*Bush, S. P.*	*P. C. C. & St. L.*	12,263	*Columbus, Ohio.*
1883	*Bushnell, R. W.*	*Bur. Cedar Rapids & Nor.*	5,163	*Cedar Rapids, Ia.*
1887	*Butler, C. J.*	*Fall Brook Coal Co.*	4,174	*Corning, N. Y.*
1890	*Butterfield, J. G.*	*Sioux City & Northern*	842	*Sioux City, Ia.*
1886	Cade, J. R.	Southern Pacific		Houston, Texas.
1893	Canda, F. E.	Canda Mfg. Co.		11 Pine St., New York.
1893	Campbell, E. A.	Houston E. & W. Texas		Houston, Texas.
1890	Carlton, E. T.	Baltimore & Ohio		Newark, Ohio.
1883	Carlton, Howard	South Baltimore Car Works.		Baltimore, Md.
1889	Carr, W. K.	Norfolk & Western		Roanoke, Va.
1890	*Carson, M. T.*	*Mobile & Ohio*	3,900	*Jackson, Tenn.*
1890	*Carver, E. E.*	*Iowa Central*	2,200	*Marshalltown, Ia.*
1887	*Casey, J. J.*	*Louis. New Orleans & Texas*	3,912	*Vicksburg, Miss.*
1884	Chamberlain, E.			Lancaster, N. Y.
1883	*Chamberlain, J. T.*	*Boston & Maine*	9,214	*Lawrence, Mass.*
1889	Charpiot, S. A.	Cent. R. R. & B. Co. of Ga.		Macon, Ga.
1891	Chase, R. G.			6753 Lafayette Ave., Chicago, Ill.
1893	Child, Alfred	C. R. I. & P.		Chicago, Ill.
1890	Clark, Isaac W.	Cape Fear & Yadkin Valley		Fayetteville, N. C.
1893	*Clark, T. P.*	*Choctaw Coal & R'y*	900	*So. McAlester, I. T.*
1893	*Clifford, C. J.*	*The Calumet & Blue Island, The Chicago & Kenosha, Chicago & South-Eastern, The Joliet & Blue Island, Mil. Bay View & Chicago.*	2,300	*So. Chicago, Ill.*
1886	Coghlan, John	Boston, R. B. & Lynn		E. Boston, Mass.
1890	*Coller, Charles*	*Louis. New Albany & Chic.*	5,700	*New Albany, Ind.*
1889	*Connolly, J. J.*	*Dul. S. So. & Atlantic*	3,497	*Marquette, Mich.*
1893	*Cooke, Allen*	*Chicago & Eastern Ill.*	7,091	*Danville, Ill.*
1887	*Cook, John S.*	*Georgia and G. J. & S.*	1,058	*Augusta, Ga.*
1893	Cooke, W. I.	Tol. St. L. & K. C.		Frankfort, Ind.
1887	*Cormack, Wm*	*Wisconsin Central*	6,700	*Stevens Point, Wis.*
1888	*Cory, Chas. H.*	*Cin. Hamilton & Dayton*	8,817	*Lima, Ohio.*
1891	Coulter, H	Phil. Wil. & Balto.		Philadelphia, Pa.
1886	Cowan, Jno.	Allegheny Valley		Verona, Pa.
1887	Cox, Lewis J.	Terre Haute Car & Mfg. Co.		Terre Haute. Ind.
1887	Cromwell, A. J.	Balto & Ohio		Baltimore, Md.
1891	Crone, S. A.	N. Y. C. & H. R. R. R.		G. C. Sta., New York.
1891	*Cullen, Jas.*	*Nashville, Chatt. & St. Louis*	3,762	*Nashville, Tenn.*
1889	Davenport, C. W.	Erie Car Works, Limited		Erie, Pa.
1886	Davis, Jas. A.	Napanee, Tam. & Quebec		Deseronto, Ontario.

LIST OF MEMBERS — *Continued.*

Date of becoming member.	Name.	Railroad Company.	No. of Cars Owned.	Address.
1887	Davis, Jno. H.....	Wilmington & Weldon......	......	Wilmington, N. C.
1888	*Davison, Geo. I...*	*Pitts. Chartiers & Yough...*	280	*McKee's Rock, Pa.*
1885	Day, W. H.......	Wil. Columbia & Augusta..	......	Florence, S. C.
1868	Demarest, G. W..	Northern Central..........	......	Baltimore, Md.
1873	Denver, James....	N. Y. N. H. & Hartford....	......	New Haven, Conn.
1888	Dickerman, C. H.	Milton Car Works.........	......	Milton, Pa.
1881	Divine, Jno. F....	Wil. & Wel., Wil. Col. & Aug. and N. E. of S. C....	......	Wilmington, N. C.
1893	Dixey, John......	McCracken & Hovey Car Co.	......	Muskegon, Mich.
1891	*Donaldson, Morley.*	*Canada Atlantic...........*	2,192	*Ottawa, Can.*
1882	Doran, J. E.	Boston & Albany	......	E. Albany, N. Y.
1892	Dow, Geo. N.....	Lake Shore & Mich. Southern	......	Cleveland, O.
1891	Downing, T.......	Elgin, Joliet & Eastern.....	......	Joliet, Ill.
1892	Doyle, John......	Mo. Kan. & Tex...........	......	Denison, Tex.
1886	Dryden, C. P.....	Union Tank Line	......	Cleveland, O.
1890	Dunbar, O. P.....	Wheeling & Lake Erie......	......	Norwalk, O.
1883	Duncan, T. G.....	Balto. & Ohio So.-Western..	......	Zaleski, O.
1893	Elliott, J. M., Jr..	The Elliott Car Co.........	......	Gadsden, Ala.
1893	Elwell, J. B.	East Louisiana	......	New Orleans, La.
1891	*Emerson, R. A....*	*Mason City & Ft. Dodge....*	129	*Ft. Dodge, Ia.*
1886	*Ennis, W. C......*	*N. Y. Susq. & Western.....*	2,807	*Wortendyke, N. J.*
1892	*English, Rich.....*	*Atlantic & Pacific..........*	2,450	*Albuquerque, N. M.*
1893	*Ferry, F. J.......*	*Louis. St. Louis & Texas....*	766	*Cloverport, Ky.*
1893	Fildes, Thos......	L. S. & M. S. R'y	......	Englewood, Ill.
1884	Finley, L.........	....	......	902 W. 4th St., Little Rock, Ark.
1877	Fletcher, Jno. B..	National Car Co...........	......	St. Albans, Vt.
1873	FORNEY, M. N....	RAILROAD & ENGINEERING JOURNAL................	......	501 FIFTH AVE., NEW YORK CITY.
1882	*Forsyth, Wm......*	*Chi. Bur. & Quincy........*	22,193	*Aurora, Ill.*
1886	Foster, Wm. A...	Fall Brook R'y Co.........	......	Corning, N. Y.
1887	Fraser, Thomas A.	Wells & French Co........	......	Phenix Bldg., Chicago, Ill.
1890	*Gage, Geo. F......*	*Hunt & Broad Top.........*	2,713	*Huntington, Pa.*
1891	*Galbraith, R. M...*	*St. Louis South-Western.....*	4,548	*Pine Bluff, Ark.*
1885	Galloway, A......	Tol. Ann Arbor & N. Mich.	......	Owosso, Mich.
1893	Garland, R. T....	Pennsylvania R. R.........	......	Altoona, Pa.
1890	Garrett, M. A....	302 Phenix Bldg...........	......	Chicago, Ill.
1892	Garrison, P. E....	West Shore	......	Buffalo, N. Y.
1888	*Garstang, Wm....*	*Clev. Cin. Chi. & St. Louis..*	19,508	*Indianapolis, Ind.*
1883	Gause, J. Taylor..	Harlan & Hollingsworth Co.	......	Wilmington, Del.
1884	Geffcken, E......	Savannah, Fla. & Western..	......	Savannah, Ga.
1891	Gibbs, A. W......	Pennsylvania R. R.........	......	Altoona, Pa.
1890	Gibbs, Geo.......	Chi. Milwaukee & St. Paul.	......	Milwaukee, Wis.
1893	Gillan, B.........	New Orleans & No.-Eastern.	......	New Orleans, La.
1891	Glover, J. B., Jr..	Marietta & Nor. Ga........	......	Marietta, Ga.
1887	Glover, Frederick.	St. L. C. Girard. & Ft. Smith	117	Cape Girardeau, Mo.

LIST OF MEMBERS — *Continued.*

Date of becoming member.	Name.	Railroad Company.	No. of Cars Owned.	Address.
1873	Graham, Chas.	Del. Lackawanna & Western		Kingston, Pa.
1889	Greatsinger, J. L.	Duluth & Iron Range	1,133	Duluth, Minn.
1885	*Grieves, E. W.*	*Baltimore & Ohio*	28,500	*Baltimore, Md.*
1886	Griffith, Fred. B.	Del. Lackawanna & Western		Buffalo, N. Y.
1889	Griggs, A.	Providence & Worcester		Providence, R. I.
1889	*Groves, J. R.*	*St. Louis & San Francisco*	5,320	*Springfield, Mo.*
1892	Gunn, Robt.	N. Y. L. E. & W.		Buffalo, N. Y.
1870	Hackett, Geo.	Philadelphia & Reading		Elizabeth, N. J.
1882	Hackney, Clem.	Fox Solid Pressed Steel Co.		Joliet, Ill.
1882	Hackney, Geo.	3963 Drexel Boulevard		Chicago, Ill.
1890	*Harding, B. R.*	*Raleigh & Gaston*	1,047	*Raleigh, N. C.*
1886	Harris, Geo. H.	Pitts. Cin. Chi. & St. Louis		Columbus, O.
1887	Harrison, W. H.	Baltimore & Ohio		Newark, O.
1893	*Hassman, Wm.*	*Newpt News & Miss. Valley Co*	4,062	*Paducah, Ky.*
1891	*Hatswell, T. J.*	*Flint & Pere Marquette*	3,430	*E. Saginaw, Mich.*
1889	*Hawksworth, D.*	*Bur. & Missouri River*	8,786	*Plattsmouth, Neb.*
1891	Hayes, R. T.	Memphis & Charleston		Memphis, Tenn.
1893	*Hayward, H. S.*	*West Jersey & Camden & Atlantic R. Rds.*	9,760	*Jersey City, N. J.*
1883	Hecker, Frank J.	Mich. Pen. Car Co.		Detroit, Mich.
1891	*Hemphill, W. J.*	*Chicago, Peoria & St. Louis.*	2,257	*Jacksonville, Ill.*
1890	Hennessey, J. J.	Chic. Milwaukee & St. Paul.		West Milwaukee, Wis.
1889	*Henry, J. J.*	*Cleveland, Akron & Col.*	1,403	*Mt. Vernon, O.*
1892	Higgins, Sam'l.	N. Y. L. E. & W.		Cleveland, O.
1888	*Higginson, John.*	*Canadian Pacific*	13,000	*Montreal, Can.*
1873	Hildrup, W. T.	Harrisburg Car Co.		Harrisburg, Pa.
1893	*Hinckley, A. C.*	*St. Joseph & Grand Island.*	1,038	*St. Joseph, Mo.*
1893	Hitt, S. B.	Nelson Morris & Co.		Chicago, Ill.
1879	Hodge, John			Topeka, Kansas.
1890	*Hoffecker, W. L.*	*Central of New Jersey*	22,632	*Elizabethport, N. J.*
1890	Holt, J. M.	Richmond & Danville		Manchester, Va.
1889	Howard, C. H.	Safety Car Heat. & Light. Co.		New York City.
1892	Hudson, W. H.	E. T. V. & G. R. R.		Atlanta, Ga.
1889	Hughes, E. W. M.	Fox Solid Pressed Steel Co.		1004 Rookery, Chicago, Ill.
1883	Huidekoper, H. S.	The Western Car Co.		2020 Spruce St., Phila.
1891	*Humphrey, A. L.*	*Colorado Midland*	1,315	*Colorado Springs, Colo.*
1884	Hunter, David W.	New York & New England.		Norwood, Mass.
1883	Irvin, Samuel	Mo. Kansas & Texas		Sedalia, Mo.
1882	Jackson, Job H.	Jackson & Sharp Co		Wilmington, Del.
1887	Johann, Jacob	Chicago & Alton		Bloomington, Ill.
1882	Johnson, F.	Buffalo Car Mfg. Co.		Buffalo, N. Y.
1893	*Johnson, J. T.*	*Valley R'y*	1,200	*Cleveland, O.*
1893	*Kearsley, Thos.*	*New York & New England.*	6,157	*E. Hartford, Conn.*
1883	Keeler, Sanford.			East Saginaw, Mich.
1883	Keith, Isaac	Keith Mfg. Co.		Sagamore, Mass.
1882	*Kenison, Chas. H.*	*Maine Central*	3,220	*Waterville, Me.*
1883	Kirby, John	Lake Shore & Mich. Southern		Adrian, Mich.

Date of becoming member.	Name.	Railroad Company.	No. of Cars Owned.	Address.
1892	Kirby, T. B.	Armour Refr. Line	......	Chicago, Ill.
1887	Kittredge, A. M.	Barney & Smith Mfg. Co.	......	Dayton, Ohio.
1884	*Lauder, James N.*	*Old Colony*	3,530	*Boston, Mass.*
1889	*Leeds, Pulaski*	*Louisville & Nashville*	18,350	*Louisville, Ky.*
1879	*Lentz, John S.*	*Lehigh Valley*	39,353	*Packerton, Pa.*
1887	Leonard, C. M.	Chicago, R. I. & Pacific	......	Davenport, Iowa.
1867	Levan, J. P.	Pennsylvania	......	Altoona, Pa.
1889	*Lewis, W. H.*	*Chicago, Bur. & Northern*	3,350	*La Crosse, Wis.*
1871	Lightner, J.	Boston & Providence	......	Boston, Mass.
1890	Lilley, Geo. W.	Canda Cattle Car Co	......	Chicago, Ill.
1890	Lindsay, Thos	Baltimore & Ohio	......	Glenwood, Pa.
1892	Lord, E. P.	H. K. Porter & Co.	......	Pittsburgh, Pa.
1891	Lungren, W. H.	Phila. Wil. & Balto.	......	Wilmington, Del.
1891	McAlpine, A. R.	Indiana Car & Fdy. Co.	......	Indianapolis, Ind.
1882	McCarthy, H. C.	Philadelphia & Erie	......	Williamsport, Pa.
1891	*McConnell, J. H.*	*Union Pacific*	27,110	*Omaha, Neb.*
1882	*McCrum, J. S.*	*K. C. Ft. Scott & Memphis*	9,131	*Kansas City, Mo.*
1893	*McGee, F. H.*	*C. R. R. & B. Co. of Ga.*	6,112	*Macon, Ga.*
1882	*McGee, James*	*Houston & Texas Central*	3,035	*Houston, Texas.*
1880	McGregor, James.	Michigan Peninsular Car Co	......	Detroit, Mich.
1882	McIlwain, J. D.	Harvey Steel Car Co.	......	Chicago, Ill.
1892	McKaig, W. H.	Long Island	......	Richmond Hill, L. I.
1893	McKeen, W. R., Jr	Terre Haute & Indianapolis.	......	Terre Haute, Ind.
1883	*McKenna, Robert*	*Del. Lackawanna & Western*	30,700	*Scranton, Pa.*
1893	*McPhail, W. B.*	*Ohio Southern*	6,300	*Springfield, O.*
1875	McWood, Wm.	Grand Trunk	......	Montreal, Can.
1889	Macbeth, James.	N. Y. C. & H. R. R. R.	......	E. Buffalo, N. Y.
1883	*Mackenzie, John*	*N. Y. Chicago & St. Louis*	7,000	*Cleveland, Ohio.*
1890	Maglenn, James.	Carolina Central	......	Laurinsburg, N. C.
1892	Manly, J. C.	Richmond & Danville	......	Atlanta, Ga.
1882	*Marden, J. W.*	*Fitchburg*	6,360	*Boston, Mass.*
1893	Maris, J. M.	Litchfield Car & Mach. Co.	......	Litchfield, Ill.
1890	*Marshall, R. E.*	*Phila. Wilmington & Balto.*	9,680	*Philadelphia, Pa.*
1886	*Martin, M. M.*	*Wabash*	13,722	*Decatur, Ill.*
1887	*Meehan, James*	*Cin. N. O. & Tex. Pac*	11,000	*Ludlow, Ky.*
1891	Michael, J. B.	East Tenn. Vir. & Ga	......	Knoxville, Tenn.
1891	Middagh, D. B.	Norfolk & Western	......	Roanoke, Va.
1892	Mileham, C. M.	Street's Stable Car Line	......	Chicago, Ill.
1867	Mileham, J. N	......	......	Rutherford, N. J.
1886	Millen, Thos.	New York & Northern	......	High Bridge, New York City.
1884	Miller, G. W.	......	......	Buffalo, N. Y.
1892	Miller, L. H.	Ind. Ill. & Iowa	......	Kankakee, Ill.
1877	Miller, Robt.	Michigan Central	......	Detroit, Mich.
1891	Mills, Stott	Lehigh & Hudson	......	Warwick, N.Y.
1889	Minton, W. D.	Texas & Pacific	......	Marshall, Tex.
1892	*Mitchell, A. E.*	*N. Y. L. E. & W.*	43,978	*New York.*
1893	Mooney, P. T.	Texas Central	......	Walnut Springs, Tex.

LIST OF MEMBERS — *Continued.*

Date of becoming member.	Name.	Railroad Company.	No. of Cars Owned.	Address.
1893	*Morgan, J. B.*	*Toledo & Ohio Central*	6,000	*Bucyrus, O.*
1889	*Morris, W. S.*	*Chesapeake & Ohio*	14,250	*Richmond, Va.*
1891	*Morse, W. M.*	*Toledo & Ohio Central Ext.*	60	*Marietta, O.*
1885	*Nelson, E. D.*	*P. & E. Div. Pennsylvania*	9,664	*Williamsport, Pa.*
1888	O'Brien, Jno. H.	Mexican Central	......	City of Mexico, Mex.
1893	Orchard, J. H.	Delaware & Hudson Canal	.....	Carbondale, Pa,
1881	Packard, L.	N. Y. C. & H. R.	......	West Albany, N. Y.
1890	*Pattee, Jos. O.*	*Great Northern*	12,117	*St. Paul, Minn.*
1887	Patterson, Jno. S.	523 Phenix Bldg.	......	Chicago, Ill.
1889	*Paxson, L. B*	*Philadelphia & Reading*	32,281	*Reading, Pa.*
1889	Payne, G. C.	Buffalo, Rochester & Pitts.	......	Buffalo, N. Y.
1889	*Peck, Peter H.*	*Chi. & West'n Ind. and Belt.*	150	*83d St., Chicago, Ill.*
1890	*Player, Jno*	*Atch. Topeka & Santa Fe*	29,734	*Topeka, Kan.*
1890	Porcher, Sam'l	Pennsylvania	......	Jersey City, N, J.
1893	*Potter, G. L*	*Pennsylvania Co.*	36,138	*Ft. Wayne, Ind.*
1885	*Preston, H. L*	*Chi. St. P. Minn. & Omaha*	9,311	*Hudson, Wis.*
1881	Prout, H. C.	The Railroad Gazette	......	73 Broadway, New York.
1891	Pullman, C. L.	Pullman Palace Car Co.	......	Chicago, Ill,
1890	*Quayle, Rob't*	*Mil. Lake Shore & West*	5,137	*So. Kaukauna, Wis.*
1888	Rankin, Jno. H.	Philadelphia & Reading	......	Reading, Pa.
1879	Raymond, J. H.	Monadnock Bldg.	......	Chicago, Ill.
1893	Reed, W. T.	Chicago Great Western	......	St. Paul, Minn.
1893	*Reiley, B.*	*Des Moines, Nor. & West'n*	210	*Des Moines, Ia.*
1883	Reilly, Patrick	Lake Erie & Western	......	Lima, O.
1890	Reniff, J. R	Lake Shore & Mich. Southern	......	Norwalk, O.
1892	Reynolds, O. H.	Northern Pac.	......	St. Paul, Minn.
1885	*Rhodes, Godfrey W.*	*St. L. Keokuk & N.-W., Chi. Bur. & K. C., Han. & St. Joe, K. C. St. Joe & Council Bluffs, Chicago & Iowa*	3,265	*Aurora, Ill.*
1893	*Richards, H*	*Chicago & West Mich.*	5,599	*Grand Rapids, Mich.*
1882	*Richardson, E.*	*Shenango & Allegheny*	774	*Greenville, Pa.*
1892	*Roberts, E. M*	*South Carolina*	1,500	*Charleston, S. C.*
1885	*Roberts, H.*	*Chicago & Grand Trunk and Det. Gr. Haven & Mil.*	4,942	*Detroit, Mich.*
1886	*Robertson, W. J.*	*Central Vermont*	7,743	*St. Albans, Vt.*
1873	Robson, A. C.	Lake Shore & Mich. South'n	......	Buffalo, N. Y.
1882	*Rommel, Geo.*	*Wilmington & Northern*	450	*Coatesville, Pa.*
1891	*Rowland, A.*	*A. & W. P., W. R'y of Ala.*	723	*Montgomery, Ala.*
1886	*Rutherford, Wm.*	*Jacks'lle, Tampa & Key West*	521	*Palatka, Fla.*
1891	Ryan, J. J.	Southern Pacific Co.	......	Houston, Texas.
1892	Ryan, Wm. A.	Northwestern Car & Mch. Co.	......	Oshkosh, Wis.
1888	*Ryder, Henry*	*Housatonic*	1,432	*Falls Village, Conn.*
1892	Sanderson, R. P. C	Norfolk & Western	......	Roanoke, Va.
1883	Salveter, T. C.	......	......	St. Louis, Mo.
1889	*Sample, N. W.*	*Denver & Rio Grande*	7,105	*Denver, Colo.*
1892	Schaffer, M. B.	Mo. Pac.	......	St. Louis, Mo.

LIST OF MEMBERS—*Continued.*

Date of becoming member.	Name.	Railroad Company.	No. of Cars Owned.	Address.
1885	Schlacks, Henry	Illinois Central		Chicago, Ill.
1887	*Schroyer, Chas. A.*	*Chicago & North-Western*	31,298	*Chicago, Ill.*
1893	*Scott, J. F.*	*Evansville & Terre Haute*	4,650	*Evansville, Ind.*
1890	SETCHEL, J. H.	PITTS. LOCOMOTIVE WORKS		PITTSBURGH, PA.
1891	*Sheer, J. M.*	*Ohio & Mississippi*	3,680	*Washington, Ind.*
1890	Sheerer, E. P.			Des Moines, Iowa.
1889	*Siddons, W. P.*	*International & Gt. Northern*	2,062	*Palestine, Texas.*
1889	*Silvius, E. T.*	*Jacksonville, St. Augustine & Indian River*	150	*St. Augustine, Fla.*
1891	Simons, J. E.	Pittsburgh & Lake Erie		Chartiers, Pa.
1889	SINCLAIR, ANGUS	LOCOMOTIVE ENGINEER		912 TEMPLE COURT, NEW YORK CITY.
1884	Skinner, J. R.	Del. & Hudson Canal Co.		Oneonta, N. Y.
1890	Small, H. J.	Southern Pacific		Sacramento, Cal.
1893	*Small, W. T.*	*Buffalo, Roch. & Pittsburgh.*	6,110	*Rochester, N. Y.*
1893	*Smith, A. D.*	*Cornwall & Lebanon*	543	*Lebanon, Pa.*
1870	Smith, C. A.	Union Tank Line		26 Broadway, New York City.
1893	Smith, F. B	N. Y. L. E. & W.		Meadville, Pa.
1880	Smith, Peter	N. Y. Cent. & Hudson River		E. Rochester, N. Y.
1882	Snow, W. B.	Illinois Central		Chicago, Ill.
1892	*Soule, R. H.*	*Norfolk & Western*	17,367	*Roanoke, Va.*
1893	Spalding, E. C.	Southern Iron Car Line		Atlanta, Ga.
1891	*Stanton, C. H.*	*Penna. Pough. & Boston*	641	*Goshen, N. Y.*
1892	*Stark, F. H.*	*Cleveland, Lor. & Wheeling.*	4,100	*Cleveland, Ohio.*
1892	*Stark, W. H.*	*Wheeling & Lake Erie*	5,200	*Toledo, Ohio.*
1883	Steinbrenner, A. G.	Am. Refrig. Transit Co.		St. Louis, Mo.
1886	Stinard, F. A.	8 Dickinson St		Paterson, N. J.
1886	Stone, W. A.			Selma, Ala.
1893	Stover, C. W.	Chicago & South Bend		South Bend, Ind.
1886	Sutherland, T.	C. & G. T. and D. G. H. & M.		Fort Gratiot, Mich.
1891	Sullivan, J. J.	Louisville Southern		Ludlow, Ky.
1892	*Summerskill, T. A.*	*Man. & North-Western*	244	*Portage la Prairie, Man.*
1879	Sweeney, John	New Haven & Northampton		New Haven, Conn.
1880	Taylor, Joseph	Michigan Peninsular Car Co.		Detroit, Mich.
1888	*Thomas, W. H*	*E. Tenn. Va. & Ga*	11,716	*Knoxville, Tenn.*
1892	Tomlinson, J. J.	Mexican Northern		Escalon, Mexico.
1892	Thompson, C. A.	Port Reading		Jersey City, N. J.
1882	*Townsend, Joseph.*	*Chicago & Alton*	7,980	*Bloomington, Ill.*
1892	*Toy, E. L.*	*Barberton Belt Line*	30	*Barberton, Ohio.*
1882	*Trainham, W. H.*	*Rich. Fred. & Potomac*	160	*Richmond, Va.*
1892	Turner, C. E.	W. N. Y. & P. R. R.		Olean, N. Y.
1889	*Turner, L. H.*	*Pittsburgh & Lake Erie*	5,426	*Pittsburgh, Pa.*
1890	*Tyrrell, Thos.*	*Stat. Island Rapid Transit*	105	*Foot Whitehall St., New York City.*
1883	*Vail, Allen*	*Western New York & Penn.*	9,168	*Buffalo, N. Y.*
1892	*Van Brunt, G. E.*	*Penna. & North-Western*	1,527	*Bellwood, Pa.*
1882	Van Buskirk, W. G.	Terre Haute & Peoria		Paris, Ill.

LIST OF MEMBERS — *Continued.*

Date of becoming member.	Name.	Railroad Company.	No. of Cars Owned.	Address.
1892	Vogt, A. S.	Penna. R. R.	......	Altoona, Pa.
1883	Voorhees, John	L. S. & M. S.	......	Chicago.
1889	Voss, Wm.	Barney & Smith Car Co.	......	Dayton, O.
1885	*Wade, R. D.*	*Richmond & Danville*	10,080	*Washington, D. C.*
1885	Wagner, J. L.	Erie & Pacific Despatch	......	Terre Haute, Ind.
1890	*Waitt, A. M.*	*Lake Shore & Mich. South.*	22,901	*Cleveland, O.*
1890	Walker, C. W.	Seaboard & Roanoke	......	Portsmouth, Va.
1889	Walker, Robert	Missouri, Kansas & Texas	......	Sedalia, Mo.
1882	Wall, E. B.	Pitts. Cincin. Chi. & St. L.	......	Chicago, Ill.
1885	*Wallis, J. M.*	*Pennsylvania*	48,771	*Altoona, Pa.*
1884	*Wallis, Herbert*	*Grand Trunk*	22,360	*Montreal, Canada.*
1887	Ward, Chas. F.	Duluth & Winnipeg	......	Duluth, Minn.
1893	Watts, A. H.	Cin. Jackson & Mack	......	Marshall, Mich.
1871	Webster, H. A.	Manhattan Elevated	......	71 Broadway, New York City.
1887	*Welch, Benjamin*	*So. Pac. (Pacific System)*	16,747	*Sacramento, Cal.*
1890	*West, Geo. W.*	*N. Y. Ontario & Western*	5.550	*Middletown, N. Y.*
1886	White, David	Intercolonial of Canada	......	Moncton, N. B.
1888	Whitehouse, A. T.	......	......	Chicago, Ill.
1885	*Whitney, Henry A.*	*Intercolonial of Canada*	6,435	*Moncton, N. B.*
1882	*Wicke, Caspar*	*Cumberland Valley*	685	*Chambersburg, Pa.*
1886	Wilbur, Rollin H.	Lehigh Valley	......	Bethlehem, Pa.
1891	*Wilcox, W. J.*	*Charleston, Cin. & Chicago*	332	*Blacksburg, S. C.*
1892	*Williams, C. D.*	*Ketner, Elbon & Shawmut*	250	*Ridgway, Pa.*
1890	*Williams, E. A.*	*M. St. P. & S. Ste. Marie*	5,586	*Minneapolis, Minn.*
1891	*Wilson, G. F.*	*Chicago, R. I. & Pacific*	15,716	*Chicago, Ill.*
1890	Wood, I. E.	Baltimore & Ohio	......	Mt. Clare, Baltimore, Md.
1890	*Wright, Nathan*	*Zanesville & Ohio River*	163	*Zanesville, O.*
1888	Zehnder, C. H.	Jackson & Woodin Mfg. Co.	......	Berwick, Pa.

Total number of cars.............. ....1,114,766.

STANDARDS AND RECOMMENDED PRACTICE

OF THE

MASTER CAR-BUILDERS' ASSOCIATION.

GENERAL.

By a letter ballot cast in 1893, the standards of the Association prevailing at that date were modified—

First.—By abolishing certain standards because they had either become obsolete or nearly so, or because they were simply forms of gauges for shop use to produce certain other standard forms, and it was believed that such gauges were not essential as standards of the Association, and it had been ascertained that they were not generally used.

The old standards thus abolished were:

Wheel diameter testing gauge.
Wheel flange and journal gauge.
Wheel bore testing gauge.
Wheel boring, use of six dogs.
Journal length and diameter gauge.
Journal shoulder and centering gauge.
Journal distance gauge.
Guard rail gauge.
Attachments and dimensions of drawbars.
Train-pipe fitting for steam heat.

Second.—By ordering that the three items formerly printed at the end of the standards, namely:

Storage of line cars on foreign roads,
Dictionary of terms,
Entertainments,

be printed with the Proceedings as heretofore, but not among the standards.

Third.—By dividing the remaining standards into:

(*a*) Standards of the Association.
(*b*) Recommended Practice.

These Standards and this Recommended Practice are given under their respective heads in the following pages as modified by letter ballot on these or other subjects.

New drawings of the Standards and Recommended Practice were ordered made on sheets of uniform size, to be lithographed and printed on transparent paper so that blue prints might be taken from them; such sheets to be held for sale by the Secretary in connection with pamphlets containing explanatory text as given in the Proceedings. Reduced copies of these sheets to be bound with the Proceedings in connection with the text of the Standards and Recommended Practice.

STANDARDS OF THE ASSOCIATION.

JOURNAL BOX AND DETAILS.

For Journals, 3¾ by 7 inches. Sheets M. C.-B. 1, 2, 3.

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893. For former action, see Proceedings 1874, page 40; Proceedings 1881, pages 14, 15 and 27.

JOURNAL BOX AND DETAILS.

For Journals, 4¼ by 8 inches. Sheets M. C.-B. 4, 5, 6.

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893. For former action see Proceedings 1891, pages 142-144.

AXLE.

With Journals, 3¾ by 7 inches. Sheet M. C.-B. 7.

This axle is the standard of the Association for cars of 40,000 pounds capacity.

In 1873 a standard for car axle was recommended, the form and dimensions of which, excepting the diameter in the middle, were substantially the same as shown in this sheet. In 1884 the diameter at the middle was increased from 3⅞ inches to 4¼ inches, by letter ballot.

For action of the Association see Proceedings 1876, page 99; Proceedings 1878, page 129; Proceedings 1879, page 103; Proceedings 1880, page 130; Proceedings 1884, pages 156-162.

AXLE.

With Journals, 4¼ by 8 inches. Sheet M. C.-B. 7.

This axle was adopted as a standard of the Association for cars of 60,000 pounds capacity, by letter ballot, in 1889; see Proceedings 1889, pages 88-109.

FORM OF WHEEL TREAD AND FLANGE.

Sheet M. C.-B. 7.

This form of wheel tread and flange was adopted as a standard of the Association, by letter ballot, in 1886. For action of the Association see Proceedings 1882, pages 178 and 179; Proceedings 1886, page 68.

DISTANCE BETWEEN THE BACKS OF THE FLANGES OF CAR WHEELS.

Sheet M. C.-B. 7.

The standard distance between the backs of car wheels as indicated at A on the drawing is 4 feet 5⅜ inches; drawing shows the form of gauge for measuring this distance.

For action of the Association, see Proceedings for 1883, pages 55, 118-120.

In 1885 it was decided by letter ballot that in fitting wheels on axles a variation of ⅛ inch each way from the standard distance of 4 feet 5⅜ inches between the flanges would be allowed, making the maximum distance 4 feet 5½ inches and the minimum distance 4 feet 5¼ inches. See Proceedings 1885, pages 111-119.

WHEEL CIRCUMFERENCE MEASURE.

Sheet M. C.-B. 7.

By letter ballot in 1893, the Wheel Circumference Measure shown on sheet 7 was adopted as a standard of the Association. Prior to that date it had been recommended for use in all car building shops. See Proceedings 1882, page 197.

BRAKE HEAD AND SHOE.

Sheet M. C.-B. 8.

The brake head and shoe shown on 'this sheet, known as the Christie brake head and shoe, were adopted as a standard of the Association, by letter ballot in 1886, with the exception of some slight modification in details made since that date.

For action of the Association, see Proceedings 1886, page 72; Proceedings 1888, pages 140, 160-161; Proceedings 1891, pages 212 and 240.

BRAKE BEAM.

Sheet M. C.-B. 8.

Certain dimensions and capacities of brake beam were adopted as standard of the Association, by letter ballot, in 1889, and these standards, as modified by subsequent action, are shown on this drawing for iron brake beams.

All beams must be capable of withstanding a load of 7,500 pounds at center without more than 1-16 inch deflection; where it is necessary to use a stronger beam, it must be capable of standing a load of 15,000 pounds at center without more than 1-16 inch deflection.

The angle of brake beam lever is 40 degrees from vertical.

For action of the Association, see Proceedings 1890 and 1893.

AIR BRAKES — GENERAL ARRANGEMENT AND DETAILS.

Sheet M. C.-B. 9.

The general arrangement and details of brake gear for air brake cars, as shown on this sheet, are standard. See letter ballot 1889, and other action 1890 and 1891. At the same time the following standards were adopted in this connection:

1. Maximum train-pipe pressure, 70 pounds per square inch.
2. Maximum brake power in freight cars, 70 per cent of the light weight of car.
3. All levers 1 inch in thickness; all pins turned to 1 3-32 inch in diameter; all jaws or clevises made of ¾-inch by 2½-inch iron; all rods ¾ inch diameter.
4. Angle of brake beam lever, 40 degrees with vertical.

PEDESTAL.

Sheet M. C.-B. 10.

The pedestal shown on this sheet was recommended in 1874. See Proceedings 1874, page 40; again approved as standard in 1881; see Proceedings 1881, pages 14, 15 and 27. Also approved by the Master Mechanics' Association in same year. Again adopted as standard in 1893. Weight, 141 pounds.

AUTOMATIC COUPLER.

Sheet M. C.-B. 11.

Form adopted as standard in 1887, see pages 199-208, 243 and 253. Further details adopted in 1889 and 1893. Action of the Association in 1889 permits the use of a coupler 28 inches long instead of 30 inches as shown, for use only on cars already in service and requiring such length drawbar. Carrier iron as shown for this coupler adopted in 1889.

CONTOUR LINE AND LIMIT GAUGES, FOR AUTOMATIC COUPLER.

Sheet M. C.-B. 11.

Standard contour line was announced by Executive Committee under instructions from the Association April 8, 1888. Limit gauges for preserving standard contour line adopted in 1891.

These gauges, properly proven by master gauges, may be procured from Pratt & Whitney Company, of Hartford, Connecticut. A duplicate set of master gauges is held in the office of the Secretary for reference when desired.

HEIGHT OF DRAWBARS.

The standard height of drawbars for passenger equipment cars is 35 inches from top of rail when car is light. Adopted in 1890; see Proceedings 1890 and 1893.

The standard height of drawbars for freight cars, measured perpendicular from the level of the tops of rails to center of drawbars, adopted in 1893, is 34½ inches, with no greater variation allowable than 3 inches, minimum height 31½ inches. See Proceedings 1872, pages 42, 43 and 46; Proceedings 1879, pages 108 and 109; Proceedings 1884, page 30.

M. C.-B. REPORTS.

In 1893 a standard size of 6 inches by 9 inches was adopted for M. C.-B. reports. See Proceedings 1893.

SCREW THREADS, BOLT HEADS AND NUTS.

The Sellers or Franklin Institute system of screw threads, bolt heads and nuts is the standard of the Association, and repeated action of the Association has deprecated the use of any other system and encouraged the careful maintenance of these standards. See Proceedings 1872, pages 18 and 21; Proceedings 1879, pages 82 and 83; Proceedings 1882, page 229.

A set of gauges for standard screw threads and a standard inch scale, 2 feet long, are held in the office of the Secretary for reference.

Mr. Sellers, who proposed this system of screw threads, described it in an essay read before the Franklin Institute of Philadelphia, April 21, 1864, as follows:

"The proportions for the proposed thread and its comparative relation to the sharp and rounded threads, will be readily understood from the accompanying diagram in which Figs. 11 and 12—the latter on an exaggerated scale—represent a sharp thread, Figs. 13 and 14 a rounded top and bottom to the English proportion, and Figs. 15 and 16 the flat top and bottom, all of the same pitch. The angle of the proposed

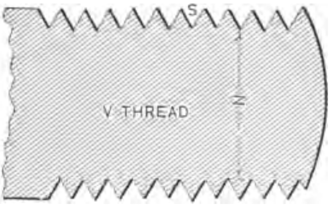


FIG. 11.

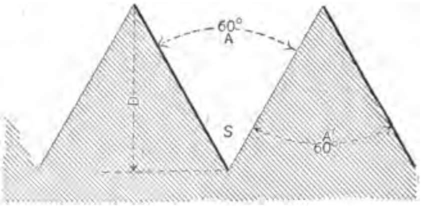


FIG. 12.

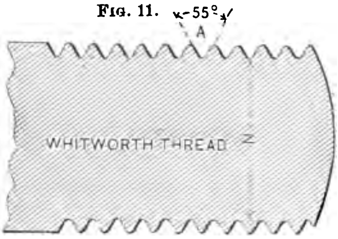


FIG. 13.

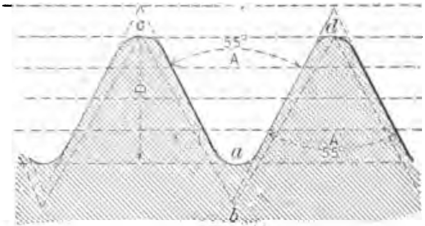


FIG. 14.

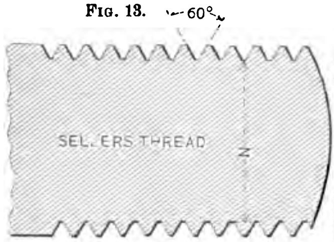


FIG. 15.

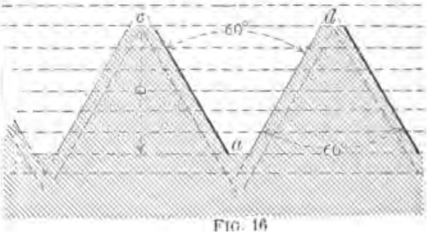


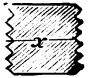
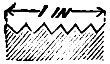
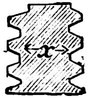
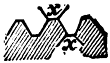
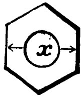
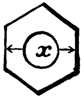
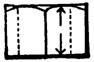
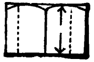
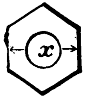
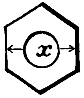
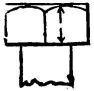
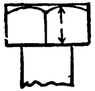
FIG. 16

thread is fixed at 60°, the same as the sharp thread, it being more readily obtained than 55°; and more in accordance with the general practice in this country. Divide the pitch, or, which is the same thing, the side of the thread into eight equal parts, take off one part from the top and fill in one part in the bottom of the thread, then the flat top and bottom will equal one-eighth of the pitch; the wearing surface will be three-quarters of the pitch, and the diameter of screw at bottom of the thread will be expressed by the formula:

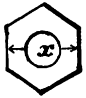
$$\textit{Diameter} - \frac{1{,}299}{\textit{number of threads per inch.}}$$

The accompanying tables are reprinted from Mr. Sellers' essay; they give the proportions of his standard screw threads, nuts and bolt heads:

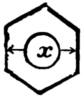
PROPORTIONS FOR SELLERS' STANDARD SCREW-THREADS, NUTS AND BOLTS.

SCREW-THREADS.				NUTS.				BOLT HEADS.			
Diameter of screw.	Threads per inch.	Diameter at root of thread.	Width of flat.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.
											
1/4	20	.185	.0062	1/2	7/16	1/4	3/16	1/2	7/16	1/4	3/16
5/16	18	.240	.0074	19/32	17/32	5/16	1/4	19/32	17/32	19/64	1/4
3/8	16	.294	.0078	11/16	5/8	3/8	5/16	11/16	5/8	11/32	5/16
7/16	14	.344	.0089	25/32	23/32	7/16	3/8	25/32	23/32	25/64	3/8
1/2	13	.400	.0096	7/8	13/16	1/2	7/16	7/8	13/16	7/16	7/16
9/16	12	.454	.0104	31/32	29/32	9/16	1/2	31/32	29/32	31/64	1/2
5/8	11	.507	.0113	1 1/16	1	5/8	9/16	1 1/16	1	17/32	9/16
3/4	10	.620	.0125	1 1/4	1 3/16	3/4	11/16	1 1/4	1 3/16	5/8	11/16
7/8	9	.731	.0138	1 7/16	1 3/8	7/8	13/16	1 7/16	1 3/8	23/32	13/16
1	8	.837	.0156	1 5/8	1 9/16	1	15/16	1 5/8	1 9/16	13/16	15/16
1 1/8	7	.940	.0178	1 13/16	1 3/4	1 1/8	1 1/16	1 13/16	1 3/4	29/32	1 1/16
1 1/4	7	1.065	.0178	2	1 15/16	1 1/4	1 3/16	2	1 15/16	1	1 3/16
1 3/8	6	1.160	.0208	2 3/16	2 1/8	1 3/8	1 5/16	2 3/16	2 1/8	1 3/32	1 5/16
1 1/2	6	1.284	.0208	2 3/8	2 5/16	1 1/2	1 7/16	2 3/8	2 5/16	1 3/16	1 7/16
1 5/8	5 1/2	1.389	.0227	2 9/16	2 1/2	1 5/8	1 9/16	2 9/16	2 1/2	1 9/32	1 9/16
1 3/4	5	1.491	.0250	2 3/4	2 11/16	1 3/4	1 11/16	2 3/4	2 11/16	1 3/8	1 11/16
1 7/8	5	1.616	.0250	2 15/16	2 7/8	1 7/8	1 13/16	2 15/16	2 7/8	1 15/32	1 13/16
2	4 1/2	1.712	.0277	3 1/8	3 1/16	2	1 15/16	3 1/8	3 1/16	1 9/16	1 15/16

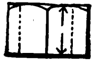
PROPORTIONS FOR SELLERS' STANDARD NUTS AND BOLTS.



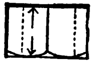
Rough Nut = one and one-half diameter of bolt + $\frac{1}{8}$.



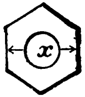
Finished Nut = one and one-half diameter of bolt + $\frac{1}{16}$.



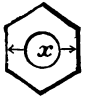
Rough Nut = diameter of bolt.



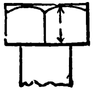
Finished Nut = diameter of bolt — $\frac{1}{16}$.



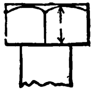
Rough Head = one and one-half diameter of bolt + $\frac{1}{8}$.



Finished Head = one and one-half diameter of bolt + $\frac{1}{16}$.



Rough Head = one-half distance between parallel sides of head.



Finished Head = diameter of bolt — $\frac{1}{16}$

RECOMMENDED PRACTICE.

Adopted as such in 1893.

CAST-IRON WHEELS.

Specifications and Guarantee.

In 1893 specifications for cast-iron wheels and a form of guarantee by manufacturers, were adopted as Recommended Practice; these had formerly been standards of the Association. See Proceedings 1889 and 1893.

They are as follows :

SPECIFICATIONS FOR CAST-IRON WHEELS.

1. " The chills in which the wheels of any one wheelmaker are cast shall be of equal diameters, and the same chill must not vary at different points more than one-sixteenth of an inch in diameter.

2. " Wheels of the same nominal diameter furnished by any one wheelmaker must not vary more than one-fourth of an inch above or below the mean size measured on the circumference, and the same wheel must not vary more than one-sixteenth of an inch in diameter. The body of the wheel must be smooth and free from slag, shrinkage or blow-holes. The tread must be free from deep and irregular wrinkles, slag, chill cracks, and sweat or beads in throat, which are one-eighth of an inch or over in diameter, or which occur in clusters of more than six inches in length."

3. " The wheels broken must show clean gray iron in the plates; the depth of pure white iron must not exceed seven-eighths of an inch or be less than three-eighths of an inch in the middle of the tread, and shall not be less than three-sixteenths of an inch in the throat. The depth of the white iron shall not vary more than one-fourth of an inch around the tread on the rail line in the same wheel."

4. " For each hundred wheels which pass inspection and are ready for shipment, one representative wheel shall be taken at random and subjected to the following test :

" The wheel shall be placed flange downward on an anvil block weighing not less than seventeen hundred (1,700) pounds, set on rubble masonry at least two feet deep, and having three supports not more than five (5) inches wide for the wheel to rest upon. It shall be struck centrally on the hub by a weight of one hundred and forty (140) pounds falling from a height of twelve (12) feet. Should this wheel stand five (5) blows without breaking into two or more pieces, the hundred wheels shall be accepted."

" The above test shall apply to standard weight wheels from twenty-six to forty-two inches in diameter, used on the standard gauge roads."

" *Or*, the wheel shall be placed flange downward on a cast-iron ring weighing one thousand (1,000) pounds, the outside diameter of the ring being thirty-six and one-half (36½) inches, the inside diameter twenty-four (24) inches, and thickness eight (8) inches, supported on rubble masonry at least two feet deep. It shall be struck on the plate, close to the rim, by a weight of one hundred (100) pounds falling from a height of seven (7) feet. When subjected to this test a five hundred and fifty (550) pound wheel shall stand twenty (20) blows; a five hundred and seventy-five (575) pound wheel, twenty-five (25) blows; and a six hundred (600) pound wheel,

(30) thirty blows without breaking a piece out. This test applies to 33-inch wheels. 26, 28 and 30 inch wheels must stand the twenty-five-blow test, and 36 and 42 inch wheels must stand the thirty-blow test."

5. "Should, in either case, the test wheel break in two or more pieces with less than the required number of blows, then a second wheel shall be taken from the same lot and similarly tested. If the second wheel stands the test, it shall be optional with the inspector whether he shall test a third wheel or not. If he does not so elect, or if he does and the third wheel stands the test, the hundred wheels shall be accepted."

6. "Wheels shall not vary from the specified weight more than two per cent."

7. "The flange shall not vary in the same wheel more than three thirty-seconds of an inch from its mean thickness."

8. "All wheels shall be numbered consecutively, and shall have the number, also the day, month and year when made, plainly formed on the inside plate in casting, and no two wheels shall have the same number."

GUARANTEE FOR CAST-IRON WHEELS.

"THIS INDENTURE, made this..................day of............18....
and between........................... ....party of the first part, and.............. ....party of the second part, Witnesseth:

"The party of the first part hereby agrees to furnish to the party of the second part, free on board cars at..
.......................chilled cast-iron wheels...................inches in diameter, for use under.................... ...."

2. "The party of the second part hereby agrees to pay to the party of the first part............................dollars for each wheel furnished, and to keep an accurate account of the mileage made by the wheels placed in service under cars in passenger equipment and under locomotives and tenders, and an accurate record of the number of months of service of the wheels placed in service under cars in freight equipment."

3. "The party of the second part hereby agrees when any wheel furnished under the contract is scrapped, to furnish to the party of the first part a statement which will show:

1. The wheel number.
2. The service in which the wheel ran.
3. The amount of service in months or miles.
4. The cause of failure.
5. A charge against the party of the first part of fifty-five per cent of the price of the wheel mentioned above.
6. A credit to the party of the first part of

........cents per 1,000 miles for 36 in. passenger equipment.
.... " " " " " 33 " " "
.... " " " " " 30 " " "
.... " " " " " 36 " locomotive and tender equipment.
.... " " " " " 33 " " " "

........cents per 1,000 miles for 30 in. locomotive and tender equipment.
.... " " " " " 28 " " " "
.... " " month " 36 " freight equipment.
.... " " " " 33 " " "
.... " " " " 30 " " "

" Except in case of wheels removed for the following causes:

1. Flat by sliding.
2. Chipped Flange.
3. Broken Flange, if the breakage is not caused by seams, worn through chill or worn flange.
4. Broken or Chipped Rim, not caused by rim being hollow.
5. Breakage of any kind caused by wreck or derailment."

4. " The party of the first part hereby agrees, on presentation of the statement above mentioned, to pay the party of the second part any balance due from lack of sufficient service on the part of the wheels (with above exceptions), to balance the charge, and the party of the second part hereby agrees to pay the party of the first part any balance due as shown by the aforesaid statement, settlements to be made quarterly."

5. " The party of the second part hereby agrees to hold, subject to the inspection of the party of the first part, for a period of thirty days after said statement has been rendered, any wheels (with above exceptions) which have not earned for themselves a credit equal to the amount charged against them."

6. " It is understood that the basis of settlement shall be as follows:

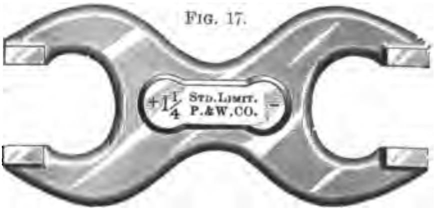
36-inch passenger wheels	70,000 miles.
33-inch passenger wheels	60,000 miles.
36-inch engine and tender wheels	60,000 miles.
33-inch engine and tender wheels	50,000 miles.
30-inch engine and tender wheels	45,000 miles.
28 and 26 inch engine and tender wheels	40,000 miles.
Refrigerator, through line and cattle cars	24 months.
All other freight cars	48 months."

LIMIT GAUGES FOR ROUND IRON.

In 1893 limit gauges and diameters for round iron were adopted as a Recommended Practice; these had formerly been standard of the Association. See Proceedings 1883, pages 37 and 38, 116-118; Proceedings 1893.

Limit gauges such as shown herewith for 1¼-inch iron are recommended for use in procuring round iron to take the Seller's standard screw threads; round iron used

FIG. 17.



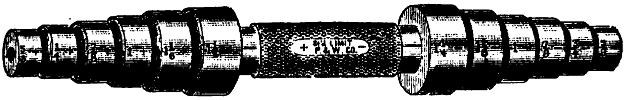


FIG. 18.

to be of such size as will enter the large or + end of the gauge intended for that size, in any way, and also of such size as will not enter the small or — end in any way.

The limiting diameters for certain nominal sizes of iron, together with the maximum variation allowable by such use of these gauges are given in the following table:

SIZES OF LIMIT GAUGES FOR ROUND IRON.

NOMINAL DIAMETER OF IRON.—INCHES.	Large Size, + end. Inches.	Small Size, — end. Inches.	Total Variation. Inches.
¼	.2550	.2450	.010
5/16	.3180	.3070	.011
⅜	.3810	.3690	.012
7/16	.4440	.4310	.013
½	.5070	.4930	.014
9/16	.5700	.5550	.015
⅝	.6330	.6170	.016
¾	.7585	.7415	.017
⅞	.8840	.8660	.018
1	1.0095	.9905	.019
1⅛	1.1350	1.1150	.020
1¼	1.2605	1.2395	.021

CHECK CHAINS.

In 1893 the use of truck and car body check chains, properly applied, was adopted as a Recommended Practice. See Proceedings 1874, pages 27 and 72; Proceedings 1893.

MARKING CARS.

In 1893 a Recommended Practice was adopted, as follows:

That all railroad companies having the same initials as other railroad companies, should stencil the name of the road in full on some part of the car where it may be readily seen. See Proceedings 1882, page 158; Proceedings 1893.

PROTECTION OF TRAIN MEN.

Sheet M. C.-B. — A.

In 1893 the following Recommended Practice was adopted to protect train men from accident, under the subheads as given:

Position of Brake-Shafts.

The brake-shaft to be placed on what is the left-hand corner of the car when a person is standing on the track facing the end of the car. The rachet wheel and brake-pawl to be fastened to a suitable casting attached to the roof. A railing or guard to be attached to the end and the roof of the car around the brake-shaft. The center of the brake-shaft to be 20 inches from the middle of the car, the nuts on the ends of the brake-shafts to be secured by split spring cotters.

See Proceedings 1888, pages 25 and 123; Proceedings 1893.

Running-boards.

The ends of the running-boards of box cars to be made to project over the ends of the cars, and properly supported, so that the *minimum* distance between the ends of those on adjoining cars will not be over 12 inches, and that the running-boards be made not less than two feet wide.

See Proceedings 1888, pages 24 and 123; Proceedings 1893.

Steps.

Two good substantial steps, to be made of wrought iron of ½ by 1¾ inches section, to be fastened, one to each side sill, next to the corner of the car to which the ladder is attached. The steps to be not less than 12 inches long, measured horizontally between the sides, and the tread to be not less than 8 inches below the bottom of the sill. The side of the step next to the corner of the car to be as near to the end of the car as is practicable. Each side of the step to be fastened to the sill with two ½-inch bolts and nuts.

See Proceedings 1888, pages 25 and 121; Proceedings 1893.

Ladder and Handholds.

Each box and stock car should have two iron or wooden ladders with not less than five steps to each ladder; the steps to be not less than 3½ inches from side or end of car; each ladder to have a handhold on the roof directly over top of ladder. When iron ladders are used and placed on ends of car, the bottom step to have a guard or projection to prevent men from slipping when swinging around the end of car to get on the step.

When the ladder is placed on the ends of car a handhold should be placed on opposite side of the end of car from the ladder and when ladder is on sides of car, two such handles should be placed on each end of car about 24 inches above the bottom of the sill.

On all freight cars which are not equipped with ladders (such as flat cars) two handholds should be attached to each end sill. Handholds on end sills should have at least 2 inches clearance behind them, and all other handholds should have at least 2½ inches clearance behind them.

All handholds should be made of iron not less than ⅝ inch diameter; handholds on sides and ends of cars should be at least 2 feet long in the clear; those on end sills to be made shorter only when it is impossible to use this length.

See Proceedings 1879, pages 109, 110 and 111; Proceedings 1893.

BUFFER BLOCKS AND LOCATION.

Sheet M. C.-B.—A.

In 1893 a Recommended Practice as shown on Sheet A was adopted for buffer blocks, single and double, and location for same, suitable for the old link and pin couplers. The beam 36 by 8 by 4 inches shown with the location of double dead blocks may be omitted if construction of car permits.

PLATFORM SAFETY CHAINS.

Sheet M. C.-B.—A.

In 1893 a Recommended Practice was adopted for location and details of platform safety chains for passenger equipment cars as shown on Sheet A. See Proceedings 1890 and 1893.

ATTACHMENT OF COUPLERS TO CARS.

Sheet M. C.-B.—B.

In 1893 a Recommended Practice was adopted for attaching M. C.-B. automatic couplers to cars, as shown on Sheet B, and by a separate vote the use of a draft spring 6¼ inches diameter, 8 inches long, with 2½ inches motion and 22,000 pounds capacity was recommended. See Proceedings 1893.

LOADING POLES, LOGS AND BARK ON CARS.

Sheet M. C.-B.—B.

In 1893 a Recommended Practice was adopted for loading logs and poles on cars and for racking cars for loading bark, as shown on Sheet B. The lines across the stakes indicate ties across the car. See Proceedings 1890; Proceedings 1893.

MARKING FAST FREIGHT LINE CARS.

Sheet M. C.-B.—B.

In 1893 a Recommended Practice was adopted for marking Fast Freight Line Cars as shown on Sheet B.

It was resolved:

1st. The half of sides of car on which the doors do not slide, to show the name of the "Fast Freight Line," spelled out in full, and the car number, in the Fast Freight Line series, immediately below it. In the same panel and within two feet of the sill shall appear, in letters not over four inches high, the name of the railroad company owning or contributing the car, and between the same and the sill shall appear the light weight of the car, with such other information as it is found advisable to give in connection with same.

2d. Side doors to bear the initials of the road to which the car belongs, or the name of the line on which the car is used, together with the number of the car.

3d. The ends to show the initials of the "Fast Freight Line" with the car number, in the Fast Freight Line series, and the light weight just below them; no other marks will appear on ends of car.

4th. The half sides of cars on which the doors do slide, to be reserved for advertising symbols or trade marks where used. The use of profuse lettering in this panel is to be discouraged, however, and it is recommended that only the simplest trade marks or advertising signs shall be used; the capacity of the car to appear near the sill in this same panel.

See Proceedings 1884, pages 96, 156 and 162; Proceedings 1893.

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Lithograph copies of the Drawings of Standards and Recommended Practice, illustrated on a reduced scale by thirteen sheets in the back of the Proceedings of 1893, may be had on a similar number of sheets, 30 by 38 inches, by applying to the Secretary at 974 Rookery building, Chicago. Blue prints can be taken direct from these sheets. The sheets will be sold at 25 cents each, plus postage when sent by mail; orders should specify how to ship if they are to go by express.

Pamphlets containing the text of the Standards and Recommended Practice, same as printed in the Proceedings of 1893, will be furnished similarly at 5 cents each.

The Lithographs and Pamphlets will be ready for delivery about November 1, 1893.

JNO. W. CLOUD,
Secretary.

Chicago, October 9, 1893.

No.	NAME OF MEMBER.	NAME OF RAILROAD COMPANY.	3¾ x 6
			a
			Yes
1	Wm. Buchanan	New York Central & Hudson River.......	50

Air Brake Repair Card.		Dummy Coupling Hook.		Diamond Truck Wheel Base, 5 ft. 2 in.		Sizes of Truck Sides, 60,000 Lbs.		Ladder Round Distance.	
o		p		q		r		s	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
......	50	50	......	50	......	50	......	50	......